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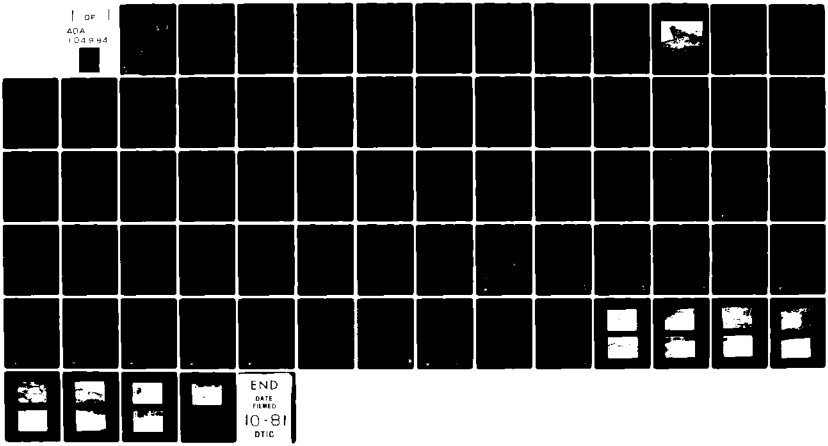

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MISSISSIPPI-ST. FRANCIS RIVER BASIN

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BURNETT LAKE DAM
SCOTT COUNTY, MISSOURI
MO 40069

PHASE 1 INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

United States Army
Corps of Engineers
...Serving the Army
...Serving the Nation

St. Louis District

PREPARED BY: U.S. ARMY ENGINEER DISTRICT, ST. LOUIS

FOR: STATE OF MISSOURI

MARCH 1981

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO. AD-A104	3. RECIPIENT'S CATALOG NUMBER 984
4. TITLE (and Subtitle) Phase I Dam Inspection Report National Dam Safety Program Burnett Lake Dam (MO 40069) Scott County, Missouri		5. TYPE OF REPORT & PERIOD COVERED Final Report
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Crawford, Murphy & Tilly, Inc.		8. CONTRACT OR GRANT NUMBER(s) DACW43-81-C-0010
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Army Engineer District, St. Louis Dam Inventory and Inspection Section, LMSED-PD 210 Tucker Blvd., North, St. Louis, Mo. 63101		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS U.S. Army Engineer District, St. Louis Dam Inventory and Inspection Section, LMSED-PD 210 Tucker Blvd., North, St. Louis, Mo. 63101		12. REPORT DATE March 1981
		13. NUMBER OF PAGES Approximately 60
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office) National Dam Safety Program. Burnett Lake Dam (MO 40069), Mississippi - St. Francis River Basin, Scott County, Missouri. Phase I Inspection Report.		15. SECURITY CLASS. (of this report) UNCLASSIFIED
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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Dam Safety, Lake, Dam Inspection, Private Dams

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

This report was prepared under the National Program of Inspection of Non-Federal Dams. This report assesses the general condition of the dam with respect to safety, based on available data and on visual inspection, to determine if the dam poses hazards to human life or property.

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DEPARTMENT OF THE ARMY
ST. LOUIS DISTRICT, CORPS OF ENGINEERS
210 TUCKER BOULEVARD, NORTH
ST. LOUIS, MISSOURI 63101

REPLY TO
ATTENTION OF

SUBJECT: Burnett Lake Dam
Scott County, Missouri
Missouri Inventory No. 40069

This report presents the results of field inspection and evaluation of Burnett Lake Dam (MO 40069).

It was prepared under the National Program of Inspection of Non-Federal Dams.

This dam has been classified as unsafe, non-emergency by the St. Louis District as a result of the application of the following criteria:

a. Spillway will not pass 50 percent of the Probable Maximum Flood without overtopping the dam.

b. Overtopping of the dam could result in failure of the dam.

c. Dam failure significantly increases the hazard to loss of life downstream.

SUBMITTED BY: SIGNED — 15 MAY 1981
Chief, Engineering Division — Date

APPROVED BY: SIGNED — 18 MAY 1981
Colonel, CE, District Engineer — Date

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MISSISSIPPI-ST. FRANCIS RIVER BASIN

BURNETT LAKE DAM
SCOTT COUNTY, MISSOURI
MISSOURI INVENTORY NO. 40069

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Prepared By

Crawford, Murphy & Tilly, Inc., Springfield, Illinois
A & H Engineering Corporation, Carbondale, Illinois

Under Direction Of

St. Louis District, Corps of Engineers

For

Governor of Missouri

MARCH, 1981

PREFACE

This report is prepared under guidance contained in Department of the Army, Office of the Chief of Engineers, Recommended Guidelines for Safety Inspection of Dams, for a Phase I investigation. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general conditions of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigation, testing and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. Additional data or data furnished containing incorrect information could alter the findings of this report.

It is important to note that the condition of the dam depends on numerous and constantly changing internal and external conditions and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

Name of Dam:	Burnett Lake Dam
State Located:	Missouri
Inventory Number:	MO. 40069
County Located:	Scott
Stream:	Unnamed Tributary to Hindman Creek
Date of Inspection:	3 December 1980

BRIEF ASSESSMENT:

Burnett Lake Dam was inspected by a team of engineers from Crawford, Murphy & Tilly, Inc. of Springfield, Illinois and A & H Engineering Corporation of Carbondale, Illinois. The purpose of this inspection was to make an assessment of the general condition of the dam with respect to safety, based upon available data and visual inspection, in order to determine if the dam poses hazards to human life or property.

The guidelines used in the assessment were furnished by the Department of the Army, Office of the Chief of Engineers, and they have been developed with the help of several Federal and State agencies, professional engineering organizations, and private engineers.

Burnett Lake Dam is an earthfill embankment constructed in 1974 and 1975 across an unnamed tributary to Hindman Creek. The dam is located about 1 mile east of Chaffee, Missouri and is owned by Mr. Thomas Burnett. The lake is used for recreation and occasional watering of livestock.

Based on the guidelines, the St. Louis District, Corps of Engineers has determined that this dam is in the high hazard potential classification, which means that loss of life and appreciable property loss could occur if the dam fails. The estimated damage zone extends approximately one mile downstream of the dam. Located within this zone are more than ten dwellings and a medium-duty highway, Missouri State Route A. The dam is in the small size classification due to its height of 19.2 feet and maximum storage capacity of 59 acre-feet. Under the guideline classification, a small size dam has a height greater than 25 feet but less than 40 feet and/or a maximum storage capacity greater than 50 acre-feet but less than 1,000 acre-feet.

Our inspection and hydrologic and hydraulic analyses indicate that the spillway capacity of the dam does not meet the criteria set forth in the guidelines for a dam having the above size and hazard potential. The dam will hold and pass approximately 10 percent of the Probable Maximum Flood (PMF) without overtopping. The Probable Maximum Flood is defined as the flood that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the region. The guidelines require that a dam of small size with a high downstream hazard potential pass

50 percent to 100 percent of the PMF. The dam has a relatively small height and small maximum storage capacity, the nearest downstream hazard is approximately 0.5 miles downstream from the dam, and the downstream channel has a mild slope of 0.6%. Considering these facts, 50 percent of the PMF has been determined to be the appropriate spillway design flood. The 1 percent probability flood (100-year flood) will overtop the dam. The 1 percent probability flood is one that has a 1 percent chance of being equalled or exceeded in any given year. The 10 percent probability flood (10-year flood) will not overtop the dam.

The dam appeared to be in poor condition and several deficiencies were noted during the inspection. There were several severe erosion problems. The hillside which forms the right slope of the emergency spillway channel has eroded and the eroded soil has partially filled in the emergency spillway channel to an elevation greater than the lowest elevation of the crest of the dam. Therefore the emergency spillway has zero capacity before overtopping of the dam would begin. There is also severe erosion on the downstream face of the dam between the center of the dam and the right abutment, which has apparently been accelerated by burrowing animals and sparse vegetation. There are minor erosion problems on the remainder of the dam due to the thin grass cover. A small trickle of flow was noted from the outlet of the 6 inch smooth steel pipe principal spillway even though the lake level was 0.8 feet below the inlet crest elevation. This flow indicates possible cracking or rusting of the pipe and it should be monitored. Also a small amount of flow was coming from the outlet end of the 6 inch diameter drawdown pipe apparently due to leakage through the gate valve located several feet from the downstream end of the pipe. Another deficiency is the lack of seepage and stability analysis records.

It is recommended that the owners take the necessary action in the near future to correct the deficiencies reported herein. A detailed discussion of these deficiencies is included in the following report.

Nathan Wilcoxon

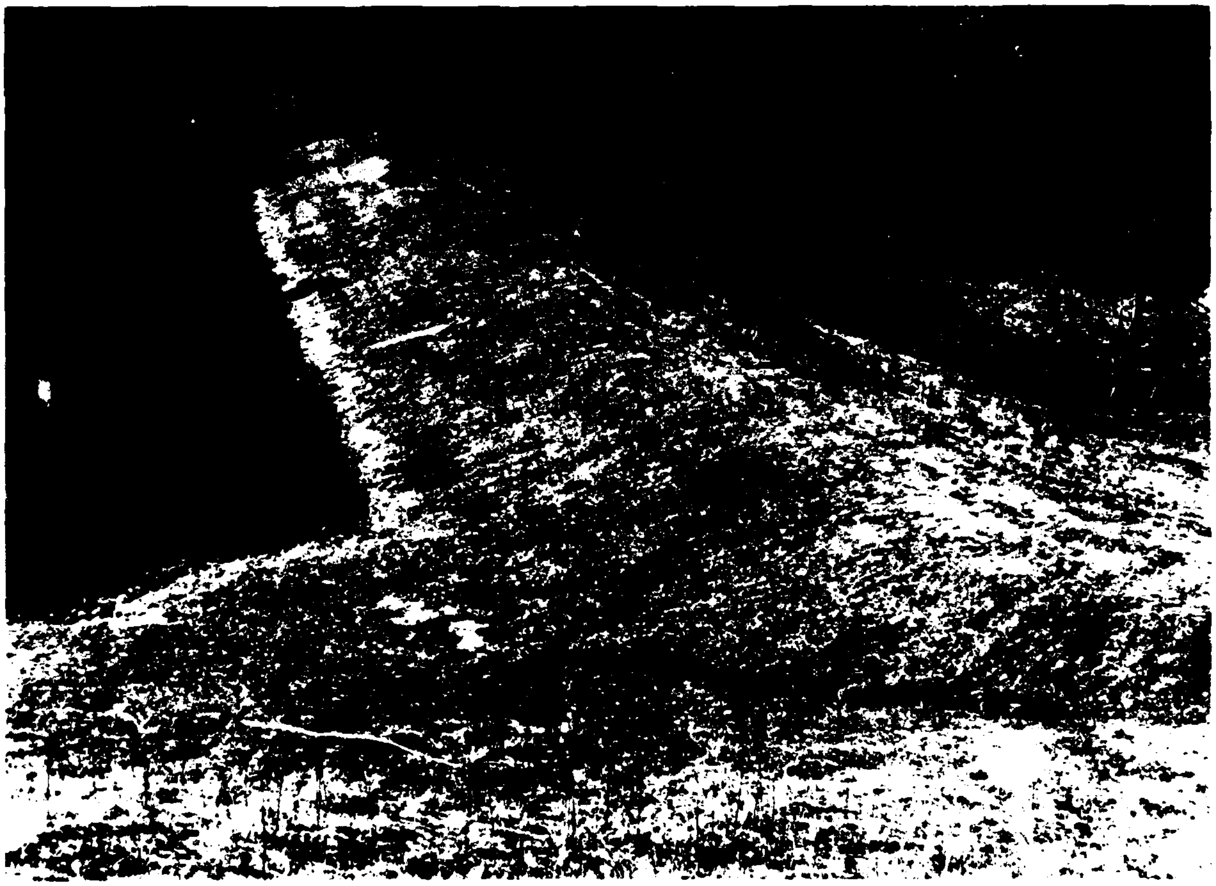
Nathan Wilcoxon, P.E.
Crawford, Murphy & Tilly, Inc.

Guy Freese

Guy Freese, P.E.
A & H Engineering Corporation

Timothy P. Tappendorf

Timothy P. Tappendorf, E.I.T.
Crawford, Murphy & Tilly, Inc.



PHOTOGRAPH 1. OVERVIEW OF BURNETT LAKE DAM.

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM
BURNETT LAKE DAM
MISSOURI INVENTORY NO. 40069

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SECTION 1 - PROJECT INFORMATION

1.1 GENERAL:

A. Authority:

The National Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of safety inspection of dams throughout the United States. Pursuant to the above, the St. Louis District, Corps of Engineers, District Engineer directed that a safety inspection be made of Burnett Lake Dam located near Chaffee, Missouri, in Scott County, Missouri.

B. Purpose of Inspection:

The purpose of the inspection was to make an assessment of the general condition of the dam with respect to safety, based upon available data and a visual inspection in order to determine if the dam poses hazards to human life or property.

C. Evaluation Criteria:

Criteria used to evaluate the dam were furnished by the Department of the Army, Office of the Chief of Engineers, Recommended Guidelines for Safety Inspection of Dams. These guidelines were developed with the help of several federal agencies and many state agencies, professional engineering organizations, and private engineers.

1.2 DESCRIPTION OF PROJECT:

A. Description of Dam and Appurtenances:

Burnett Lake Dam is an earthfill structure approximately 19.2 feet high and 294 feet long at the crest. The principal spillway is a 6 inch diameter ungated smooth steelpipe with a trash rack on the upstream end. The pipe slopes through the embankment and discharges just beyond the toe of the embankment. There is an emergency spillway channel cut into natural ground just right of the right abutment. In this report right and left orientation are based on looking in the downstream direction. The emergency spillway channel has been partially filled in by material which has eroded from the hillside which forms its right slope. There is a drawdown facility consisting of a 6 inch diameter smooth steel pipe with a gate valve that is operated by a hand wheel located near the downstream end of the pipe.

B. Location:

The dam is located about one mile east of Chaffee, Missouri in Scott County on an unnamed tributary to Hindman Creek. The longitude of the dam

is 89° 38.3' west and the latitude is 37° 10.3' north. The dam is located in Section 17 and the watershed is located in Sections 16, 17, 20 and 21 of Township 29 North, Range 13 East of the 5th Principal Meridian. The dam and watershed are within the Chaffee, Missouri 7.5 minute quadrangle map. Included in Appendix A are a location map for the dam on Plate 1 and a vicinity map on Plate 2.

C. Size Classification:

Burnett Lake Dam has an embankment height of approximately 19.2 feet and a maximum storage capacity of approximately 59 acre-feet. Therefore, the dam is in the small size category.

D. Hazard Classification:

The St. Louis District, Corps of Engineers has classified this dam as a potential high hazard dam. The estimated damage zone extends approximately one mile downstream of the dam. Located within this zone are 10 or more dwellings and Missouri State Route A. The affected items in the damage zone were verified by the inspection team.

E. Ownership:

The dam is owned by Thomas Burnett, Route 1, Box 171, Chaffee, Missouri 63740, telephone 314-887-3392.

F. Purpose of Dam:

The dam and lake are used for recreational purposes and occasionally for watering of livestock.

G. Design and Construction History:

According to the present owner, Thomas Burnett, the dam was constructed in 1974 by Schlosser Construction Company of Benton, Missouri for Nick Halter who owned the property at that time. Mr. Burnett had no recorded information on the design or construction of the dam.

According to Mr. William Schlosser of Schlosser Construction Company the design of the embankment was done by the Scott County Soil Conservation Service. He did not know how detailed their design was but knew they had done the hydrologic design for the principal and emergency spillways. He said that construction of the dam began in 1974 by another contractor but the contractor did not have the proper equipment to do the job. Mr. Schlosser said his company took the job and constructed the dam in June or July of 1975.

Mr. Schlosser said that the dam has a core trench that has a bottom width of 8 feet and was as deep as 9 feet. He said that the core trench was excavated with an end loader and the fill was placed with a scraper and shaped

with a bulldozer. He said the fill material was obtained from the hill at the right abutment and that the principal spillway pipe has two anti-seep collars.

The Scott County Soil Conservation Service office has no records of the design or construction of the dam. The SCS personnel did not remember providing any technical assistance for this dam.

The only modification to the dam known to have occurred was the excavation of soil from the emergency spillway channel by Mr. Burnett. The emergency spillway channel has been filled in by soil eroding from the hillside which forms its right slope and Mr. Burnett cleaned this soil out of the channel several years ago.

H. Normal Operating Procedures:

The only operating equipment at the dam is the gate valve on the drawdown pipe. Flows into the lake are passed by the principal spillway pipe. Originally flows would also be passed through the emergency spillway channel, but the channel has become filled in by material due to erosion. Overtopping of the dam will occur before flow in the emergency spillway channel begins.

Mr. Burnett said that he has no schedule of operation or maintenance. He stated that when the level of the lake rises above the principal spillway he usually opens the drawdown gate valve and leaves it open until the lake level drops below the principal spillway inlet elevation.

1.3 PERTINENT DATA:

A. Drainage Area (Acres)	112
B. Discharge at Damsite (CFS):	
Maximum known flood at damsite	Dam was overtopped in 1977
Drawdown facility capacity at maximum pool	2.5 (estimated)
Principal spillway capacity at maximum pool	2.7
Emergency spillway capacity at maximum pool	0
Total spillway capacity at maximum pool	2.7
C. Elevation (Ft. above MSL):	
Top of dam	395.9
Streambed at downstream toe of dam	376.7
Normal pool	390.0

Principal spillway crest inlet	390.0
Principal spillway outlet invert	376.5
Emergency spillway crest	396.1
Drawdown facility inlet	unknown
Drawdown facility outlet invert	376.8
Pool elevation during inspection 12/3/80	389.2
Apparent high water mark	Dam was overtopped in 1977
Maximum tailwater	unknown

D. Reservoir Lengths (Feet):

At top of dam	1100
At principal spillway crest	900
At emergency spillway crest	1110

E. Storage Capacities (Acre-Feet):

At top of dam	59
At spillway crest	25
At emergency spillway crest	60
At pool level during inspection 12/3/80	22
At elevation of apparent high water mark	unknown

F. Reservoir Surface Areas (Acres):

At top of dam	7.0
At principal spillway crest	4.7
At emergency spillway crest	7.1
At pool level during inspection 12/3/80	4.4
At elevation of apparent high water mark	unknown

G. Dam:

Type		earthfill embankment
Length of crest (feet)		294
Height (feet)		19.2
Top width (feet)		11
Side slopes (Horiz.:Vert.)	Upstream	3.6:1
	Downstream	3.25:1
Zoning		unknown
Impervious core		unknown
Cutoff trench	Reported as:	8' bottom width 9' maximum depth
Grout curtain		unknown

H. Diversion and Regulating Tunnel: unknown

I. Spillway:

I.1 Principal Spillway:

Location	140' right of left abutment
Type	Ungated 6" diameter smooth steel pipe through the dam - it has a trash rack and 2 anti-seep collars.
Length (feet)	100
Crest elevation (feet above MSL)	390.0
Outlet elevation (feet above MSL)	376.5

I.2 Emergency Spillway: Excavated channel just right of the right abutment had been used as emergency spillway but eroded soil has filled it in to an elevation higher than the low point of the dam.

J. Regulating Outlets:

Location	185' right of left abutment
Type	6" diameter smooth steel pipe through dam
Length (feet)	150 (estimated)
Access to closure	Gate valve near downstream end of pipe at toe of dam.

SECTION 2 - ENGINEERING DATA

2.1 DESIGN:

No engineering design data were obtained for Burnett Lake Dam. According to Mr. William Schlosser of Schlosser Construction Company, the Scott County SCS designed the dam but the SCS had no information on file and SCS personnel did not remember providing any technical assistance on the dam.

A. Surveys:

No detailed surveys have been made of the dam to our knowledge.

B. Foundation and Embankment Design:

No foundation and embankment design computations were available.

C. Hydrology and Hydraulics:

No hydrologic or hydraulic design computations were available.

D. Structures:

There are no structures other than the embankment.

2.2 CONSTRUCTION:

According to the present owner, Tom Burnett, the dam was constructed in 1974 by Schlosser Construction Company of Benton, Missouri. The owner of the property at that time was Nick Halter. No construction inspection information or other construction data were available for the dam from Mr. Burnett.

According to Mr. William Schlosser of Schlosser Construction Company, construction on the dam was begun in 1974 by another contractor but the contractor did not have the proper equipment to do the job. The Schlosser Construction Company took over the job and constructed the dam in June or July of 1975. Mr. Schlosser said the dam has a core trench which was excavated with an end loader and which has a bottom width of 8 feet and has a maximum depth of at least 9 feet. He said the fill material was obtained from the hill at the right abutment and it was placed with a scraper and shaped with a bulldozer. He did not indicate that any compacting equipment other than the scraper and bulldozer was used.

One modification has been done to the dam since it was constructed. The emergency spillway channel was filled in by soil that eroded from the right slope of the channel. The soil was removed from the emergency spillway channel several years ago but since that time the channel has been filled in again.

2.3 OPERATION:

The only operating equipment at the dam is the gate valve on the drawdown pipe. No operating records have been made. According to Mr. Burnett, he opens the gate valve on the drawdown pipe periodically to lower the lake level below the principal spillway crest. Outflow normally passes through the ungated principal spillway pipe.

No failures of the dam are known to have occurred. Mr. Burnett said that the dam was overtopped in 1976. He said that there was a sizeable amount of flow through the emergency spillway and only a small amount of flow over the dam. The depth and duration of the rainfall that caused overtopping was not known. The dam was apparently not breached when it overtopped but there is some evidence of erosion as a result of the overtopping.

Although Mr. Burnett indicated that the dam was overtopped in 1976, review of rainfall data from gages in the surrounding area show a storm that was at or above the magnitude of the 1 percent probability storm occurred in late March, 1977. It is believed that the dam was overtopped in 1977 as a result of this storm rather than in 1976 as Mr. Burnett indicated.

2.4 EVALUATION:

A. Availability:

No engineering data, seepage or stability analyses, hydrologic or hydraulic analyses, or construction inspection data were available. Some history of the construction of the dam and its operation were obtained from the present owner, Mr. Thomas Burnett and from Mr. William Schlosser of Schlosser Construction Company. To our knowledge, no inspections or surveys of the dam have occurred since its construction.

B. Adequacy:

Due to the fact that no engineering data were available, a detailed assessment of the design and construction of this structure could not be made. The information presented above, in combination with the field survey and visual inspection, is considered adequate to support the conclusions in this report. However, the fact that no seepage and stability analyses comparable to the requirements of the Recommended Guidelines for Safety Inspection of Dams were available is a deficiency which should be rectified. The seepage and stability analyses should be performed for appropriate loading conditions (including earthquake loads) and made a matter of record.

C. Validity:

No conclusions can be drawn concerning the validity of the original design analyses due to unavailability.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS:

A. General:

The field inspection was made on 3 December 1980. The inspection team consisted of personnel from Crawford, Murphy & Tilly, Inc. of Springfield, Illinois and from A & H Engineering Corporation, Carbondale, Illinois. The members were:

Nathan Wilcoxon, P.E. - Crawford, Murphy & Tilly, Inc.
Guy Freese, P.E. - A & H Engineering Corporation
Timothy Tappendorf, E.I.T. - Crawford, Murphy & Tilly, Inc.

The field inspection included the determination of dimensions and elevations of the dam and appurtenances necessary to show as a minimum a plan view, a dam crest profile, a spillway profile and section, and pertinent cross sections of the dam. For this report all elevations were obtained using the centerline of Missouri Route A highway at the centerline of the roadway leading to the dam and the residence of Thomas Burnett as elevation 482.0 above Mean Sea Level. This elevation was obtained from information on the Chaffee, Missouri 7.5 minute quadrangle map. A visual inspection of the dam, spillways, drainage area, and downstream channel was performed and photographs were taken of each of them.

No one accompanied the inspection team during the inspection. Mr. Thomas Burnett, the current owner, was interviewed following the inspection. Mr. William Schlosser of Schlosser Construction Company was contacted by telephone following the inspection.

Maps and general drawings of the dam and appurtenances are presented on Plates 1 through 5 in Appendix A and a hydrologic and hydraulic analysis is presented in Appendix B. Photographs of the dam and appurtenances are presented in Appendix C.

B. Regional and Project Geology

The general southeastern Missouri area is underlain wholly or partially by Coastal Plain sediments. The Ozark Escarpment, which is the northwestern boundary, divides the lowland area from the Ozark Province. This is an irregular boundary which trends northeast by southwest from the southern sections of Cape Girardeau County through Bollinger County, Wayne County, Butler County and into Arkansas. All of Scott County, Stoddard County, Dunklin County, New Madrid County, Mississippi County and Pemiscot County (of the Mississippi embayment) are underlain by sediments of the Ozark Escarpment.

The Mississippi embayment is a broad arm of the Gulf Coastal Plain which extends up the Mississippi River Valley from the Gulf of Mexico. The outer rim of this embayment is outlined by outcrops of consolidated Paleozoic sediments. The embayment is structurally a downwarped, spoon-shaped trough developed on the Paleozoic rocks.

One of the most prominent topographic features of the embayment is the Benton Hills of northern Scott County and southern Cape Girardeau County. The Benton Hills Ridge dominates the subsurface geology of Scott County. The dam site lies on the west central section of Benton Hills Ridge. A significant fault zone splits Scott County, just south of the Benton Hills region.

The subsurface geology around this site is comprised of Quaternary, Cretaceous and Ordovician deposits. The Ordovician bedrock overlies the Cambrian bedrock.

The immediate dam site is covered with a silt rich modified loess (ML-CL) with an apparent thickness in the range of 10 to 30 feet. The modified loess soils are visible on the sides of the valley and are exposed to the right of the right abutment.

Although not visible in the area of the dam, the Cretaceous formation underlies the modified loess and consists of the McNairy (Ripley) formation. This formation consists of sandy clay with scattered gravel and thin sandstone beds.

Rock outcrops were not observed in the immediate site area. The bedrock underlying the dam site is the St. Peter sandstone of the Champlainian Series. The St. Peter formation is composed of a well sorted, massive, medium to fine sized grain quartozose sandstone with some local orthoquartzite. The sandstone beds are occasionally cross bedded and exhibit ripplemarks. The thickness of this formation ranges from 10 to more than 100 feet. The St. Peter sandstone is a firm rock formation. The upper portions of this formation are usually weathered and some leakage can occur in the upper part of the formation.

The dam site is located in Seismic Zone 3 as shown on Plate 3 of Appendix A. The site is located north of the New Madrid area, which is seismically active at the present time.

C. Dam:

Burnett Lake Dam is an earthfill dam with a height of approximately 19.2 feet and a length at the crest of approximately 294 feet. There is a principal spillway consisting of a 6 inch diameter smooth steel pipe that slopes through the embankment. There is an emergency spillway channel cut into original ground just right of the right abutment. There is a drawdown facility consisting of a 6 inch diameter smooth steel pipe through the embankment with a gate valve controlled by a hand wheel near the toe of the dam. The overall condition of the dam appears to be poor.

Both vertical and horizontal alignment of the crest of the dam appear fairly uniform. The horizontal alignment of the crest is a straight line and the crest has a width of approximately 11 feet.

The elevation of the centerline of the crest of the dam varies from 395.9 to 397.9. Although there is 2.0 feet of variation in the crest elevation, the visual inspection of the vertical alignment reveals no major problem. Most of the variation appears to be caused by the upward slope of the embankment crest as it approaches the left abutment. Most of the change in elevation occurs within 30 feet of the left abutment. Also some variation in elevation of the crest appears to have been caused by greater settlement where the height of the embankment was greater. The profile of the crest of the dam is shown on Exhibit 3 of Appendix B.

The upstream and downstream slopes of the dam are fairly uniform. Although the slope of the downstream face is fairly uniform, the surface has a ridge-like roughness running approximately parallel with the crest as seen in Photograph 4. The crest and upstream face also have this roughness but it is not as pronounced. The crest of the dam is slightly rounded and the break between the crest and the upstream and downstream slopes is not well defined. A typical cross section of the dam can be seen on Plate 5 of Appendix A.

All of the embankment had a thin grass cover and no trees were growing on the embankment. Cattle had recently been grazing on the dam according to Mr. Burnett, and they had apparently caused deterioration of the grass cover. Erosion gullies of 4 inches to 12 inches in depth were noted at many locations on both the upstream and downstream faces of the dam. The erosion was especially severe on the downstream slope between the center of the dam and the right abutment. The upstream slope, the crest, and the downstream slope can be seen in Photographs 2, 3 and 4. Erosion at the left abutment on the downstream slope can be seen in Photograph 11. The dam had no upstream wave erosion protection and minor shoreline erosion was noted just above the principal spillway pipe inlet elevation. The erosion from wave action on the upstream face of the dam is minor and no protection is required at the present time.

Several animal burrows were noted on the downstream slope and a muskrat was seen swimming in the lake on the day of the inspection. The animal burrows seem to have accelerated the erosion problem on the downstream face. It appeared that water had run into the animal holes on the downstream slope and had caused erosion tunnels which exited near the toe of the dam. A view of one of the holes can be seen in Photograph 10.

No surface cracks or unusual movement or cracking at or beyond the toe of the dam was noted. Minor seepage was noted in the discharge channel just below the toe of the dam. There was some rust colored sediment in the scour hole below the principal spillway outlet. The seepage and sediment may be caused by leakage through the principal spillway pipe as discussed in Paragraph 3.1 D.1. The seepage flow was too small to measure. No foundation drains were observed.

A shallow soil sample was obtained from the embankment near the center of the crest. The sample was classified as a brown clayey silt (ML). The potential for erosion is high for this soil type.

D. Appurtenant Structures:

D.1 Principal Spillway:

The principal spillway consists of a 6 inch diameter smooth steel pipe which slopes through the embankment and is located 140 feet right of the left abutment. The pipe is approximately 100 feet in length and has a slope of approximately 13.5%. According to Mr. William Schlosser, there are two anti-seep collars on the pipe.

The intake end of the pipe and the trash rack covering it can be seen in Photograph 5. The principal spillway has a canopy inlet and a basket type trash rack. A sketch of the inlet and trash rack showing dimensions is shown on Exhibit 5 of Appendix B. A railroad tie was lying across the pipe and pieces of dead wood were lying near the intake as seen in Photograph 5. Erosion has occurred around the intake and has caused a small washed out area leading to the intake.

The outlet end of the principal spillway pipe can be seen in Photograph 6. About 7 feet of the pipe is exposed and it extends several feet past the toe of the dam. The portions of the principal spillway pipe that could be observed were in good shape and structurally sound but were slightly rusted. The outlet discharges into an oval shaped scour pool which measures 8 feet by 14 feet and is several feet deep. The scour pool is surrounded by several small trees which can be seen at the right edge of Photograph 1 at the front of the report.

A small trickle of water was discharging from the outlet of the pipe even though the lake water level was 0.8 feet below the inlet elevation. There was some rust colored sediment in the scour pool. This trickle of flow and sediment may be due to a hole or crack in the principal spillway pipe.

D.2 Emergency Spillway:

The emergency spillway is an excavated trapezoidal cut into the hillside just right of the right abutment. Both slopes of the channel are part of the hillside which was not cut away. There is a severe erosion problem on the hillside which forms the right slope of the emergency spillway channel. This erosion can be seen in Photograph 9. Material from this area has washed into the channel and caused the high point of the emergency spillway to be above the low point of the dam. The emergency spillway channel was cleaned of the material that washed into it several years ago but since then has filled in once again. A profile of the emergency spillway flow line can be seen on Exhibit 6 of Appendix B. The elevation of the high point of the emergency spillway channel in relation to the top of dam elevations can be seen on the Profile of Crest on Exhibit 3 of Appendix B. A cross section of the emergency spillway channel at the centerline of the crest is shown on Exhibit 7 of Appendix B.

The approach channel is the upstream right abutment slope and is a broad U-shaped channel. The crest of the emergency spillway is not well defined due to the erosion. The approach channel and most of the crest area have a thin grass cover similar to that on the dam. There was a shallow gully near the high point of the channel where eroded soil had recently been deposited and no vegetation had begun to grow. The high point of the channel is located about 65 feet downstream from the centerline of the dam. Runoff from the hillside on the right slope of the channel drains into the channel and flows back into the lake. This runoff has caused an erosion gully in the approach channel. Photograph 7 shows a view of the approach channel and the crest looking downstream from near the water's edge.

At the downstream end of the emergency spillway channel there is a sharp drop where erosion gullies have formed. According to Mr. Burnett there was a large amount of flow in the emergency spillway in 1976 and most of the erosion at the downstream end occurred then. A view of the erosion and gullies is shown on Photograph 8.

D.3 Drawdown Facility:

The drawdown facility consists of a 6 inch diameter smooth steel pipe which extends through the embankment and is located approximately 185 feet

right of the left abutment. The exact length of the pipe and the location of the upstream end is not known. The downstream end of the pipe extends several feet beyond the toe of the dam. There is an inner tube, most of which has been torn away, around the outlet end of the pipe. The drawdown facility is controlled by a gate valve operated by a hand wheel located about 6 feet from the downstream end of the pipe near the toe of the dam. A small amount of leakage was noted coming from the outlet of the drawdown pipe. The leakage appeared to be coming through the gate valve. The drawdown facility outlet can be seen in Photograph 12.

E. Reservoir and Watershed:

The watershed for Burnett Lake contains approximately 112 acres. The surface area of the lake is about 4% of the watershed area when it is at the principal spillway inlet elevation of 390.0 and about 6% when it is at the top of dam elevation of 395.9. The reservoir is surrounded by woodland and has several small trees protruding from it near the shoreline. A view of the lake is given in Photograph 14. The remainder of the watershed is heavily wooded except for a small amount of pasture land near the upstream boundary. The wooded areas have average slopes of 10 to 25% and the pasture lands have average slopes of 6 to 10%. A view of a typical heavily wooded area of the watershed is given in Photograph 15.

About 30% of the watershed has soil belonging to the Adler Series which is in hydrologic Group C as defined by SCS and 70% of the watershed has soil belonging to the Memphis Series which is in hydrologic Group B. Sedimentation of the reservoir appeared minor. Erosion from the hillside at the right abutment appeared to be the biggest sedimentation problem. No measurements of sedimentation have been taken.

F. Downstream Channel:

There is an oval shaped scour pool at the downstream end of the principal spillway pipe. The discharge channel from the pool is a V-shaped ditch 2 to 3 feet wide by 2 feet deep. About 40 feet downstream of the toe of the dam the discharge channel is joined by a ditch which runs from just below the downstream end of the emergency spillway channel. This ditch is also joined by a small ditch from the drawdown pipe. The discharge channel is lined by many small trees for the first 100 feet and then there is a thick brush cover. The downstream channel then becomes approximately trapezoidal and extends 0.8 miles at an average slope of 0.6% before its confluence with Hindman Creek. A view of the discharge channel, the emergency spillway ditch, and downstream channel is given on Photograph 13.

3.2 EVALUATION:

Several deficiencies exist which need to be monitored and corrected. The lack of a seepage and stability analysis, including seismic loading, is a deficiency which should be corrected.

There are several problems associated with erosion. The most significant problem is the fact that material from the hillside which forms the right slope of the emergency spillway channel is rapidly eroding and has filled in the emergency spillway channel. This has effectively made the capacity of the emergency spillway zero before overtopping of the dam begins. If the emergency spillway is cleaned, means should be provided to control the erosion at the downstream end of the channel and on the right slope. There is also severe erosion on the downstream face of the dam which has been accelerated by the fact that animals have burrowed in the dam. There is minor erosion on all of the dam surface and the thin grass cover on the dam is not enough to control the erosion. The erosion gullies need to be repaired and reseeded and a better grass cover promoted to help control future erosion. Any burrowing animals should be removed or destroyed and their burrows filled. Cattle should not be allowed to destroy the grass cover on the dam.

The erosion on the upstream face of the dam at the water level and erosion around the principal spillway inlet should be monitored. If this erosion worsens in the future, some form of protection may be required. Any debris which collects around the inlet should be removed. The flow from the principal spillway pipe even though the lake level is below the inlet elevation indicates that there may be a crack or a hole due to rusting in the pipe. The flow should be monitored and corrective action taken if the flow increases or becomes murky or muddy. The leakage from the drawdown pipe should also be monitored. The apparent seepage and rust colored sediment in the discharge pool may have been caused by the flow of water from the principal spillway pipe but this area should be monitored in the future for signs of seepage through the dam.

The spillway capacity of this dam is considered seriously inadequate, as discussed in Section 5, and should be increased.

SECTION 4 - OPERATIONAL PROCEDURES

4.1 PROCEDURES:

The only operating equipment at Burnett Lake Dam is the gate valve on the drawdown pipe. Flows from the lake are passed by the uncontrolled principal spillway pipe. In the past flows had also been passed by the uncontrolled emergency spillway channel but the channel has been filled in to an elevation greater than the top of the dam. The drawdown pipe valve is opened periodically, especially when the level of the lake rises above the principal spillway inlet.

4.2 MAINTENANCE OF THE DAM:

Maintenance of the dam is performed by the present owner, Mr. Tom Burnett. Several years ago, Mr. Burnett cleaned out the material which had filled in the emergency spillway channel. Since that time the channel has been filled in again. Mr. Burnett has killed muskrats in the lake several times in the past.

No maintenance has been performed recently on the erosion gullies or to the surface cover on the dam.

4.3 MAINTENANCE OF OPERATING FACILITIES:

The only operating equipment is the gate valve on the drawdown pipe. The valve is operable and is opened periodically. No other maintenance is done to it.

4.4 DESCRIPTION OF ANY WARNING SYSTEM IN EFFECT:

No warning system is known to exist.

4.5 EVALUATION:

Maintenance of the dam should be improved. The erosion gullies and holes should be repaired and reseeded. A better vegetal cover should be established and maintained. Any debris which collects around the principal spillway inlet should be removed. Any muskrats or other burrowing animals should be removed or destroyed and their burrows filled. Any trees which may begin to grow on the dam should be cut down. The leakage through the gate valve on the drawdown pipe should be monitored and the valve repaired if necessary. The flow from the principal spillway pipe should be monitored and the pipe should be repaired if the flow increases substantially or becomes murky when the lake level is still below the principal spillway inlet.

SECTION 5 - HYDRAULIC/HYDROLOGIC

5.1 EVALUATION OF FEATURES:

A. Design Data:

No hydrologic or hydraulic design computations for Burnett Lake Dam and its watershed are available. According to William Schlosser, the Scott County SCS did the hydrologic design of the principal and emergency spillways but the SCS personnel did not remember providing any technical assistance and found no records of the design of the dam.

The significant dimensions of the dam and reservoir were measured or surveyed on the date of inspection or estimated from available topographic mapping. The map used in the analysis is the 7.5 minute U.S. Geological Survey quadrangle sheet for Chaffee, Missouri, dated 1963 and photo revised 1978. Surface soil information was available from a map obtained from the Scott County Soil Conservation Office.

B. Experience Data:

No recorded rainfall, runoff, discharge, or reservoir stage data were available for the lake and watershed. Information obtained from Mr. Burnett indicated that in 1976 the dam had been overtopped. There was only a very small amount of flow over the dam but a large flow in the emergency spillway which caused several large erosion gullies at the downstream end of the emergency spillway channel. The magnitude of the storm which produced this overtopping was not known.

Although Mr. Burnett indicated that the dam was overtopped in 1976, review of rainfall data from gages in the surrounding area show a storm that was at or above the magnitude of the 1% probability storm occurred in late March, 1977. It is believed that the dam was overtopped in 1977 as a result of this storm rather than in 1976 as Mr. Burnett indicated.

C. Visual Observations:

Descriptions of the watershed and reservoir, the principal spillway, emergency spillway, and drawdown facility are given in Section 3. The lake level was controlled in the past by the principal spillway and the emergency spillway. Presently the lake level is controlled only by the principal spillway since the emergency spillway has been filled in by eroded material to an elevation greater than the top of the dam. An apparent high water mark could not be seen, but from information obtained from Mr. Burnett, it is believed to be just above the low point of the crest of the dam which is at elevation 395.9. The crest of the principal spillway is 5.9 feet below the top of the dam and the principal spillway has a capacity of about 2.7 cfs when the lake level is at the top of the dam.

A description of the downstream channel is given in Paragraph 3.1 F. The downstream hazard zone extends approximately one mile downstream from the dam and includes more than 10 dwellings and Missouri State Route A, which is a medium-duty highway.

D. Overtopping Potential:

Based on the hydrologic and hydraulic analysis presented in Appendix B, the dam and its spillways have the capacity to store and pass approximately 10 percent of the Probable Maximum Flood (PMF) without being overtopped. The Probable Maximum Flood is defined as the flood discharge that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in a region. The recommended guidelines from the Department of the Army, Office of the Chief of Engineers, require that this dam which is in the small size category with a high downstream hazard potential classification pass 50 percent to 100 percent of the PMF without overtopping. The dam has a relatively small height and small maximum storage capacity, the nearest downstream hazard is approximately 0.5 miles downstream from the dam, and the downstream channel has a mild slope of 0.6%. Considering these facts, 50 percent of the PMF has been determined to be the appropriate spillway design flood. Thus the spillway capacity of this dam is considered seriously inadequate. The dam and spillway will not hold and pass a 1 percent probability flood without overtopping the dam. The dam and spillway will hold and pass a 10 percent probability flood without overtopping the dam.

Data for the 10 percent PMF, the 50 percent PMF, and the 100 percent PMF is presented in the table below.

Percent PMF	Starting Pool Elevation (MSL)	Peak Inflow To Lake (cfs)	Maximum Pool Elevation (MSL)	Maximum Depth Over Dam (feet)	Peak Discharge (cfs)	Overtopping Duration (hour)
10%	390.9	262	395.76	0	3	0
50%	390.9	1308	397.35	1.45	1206	10+
100%	390.9	2616	398.03	2.13	2530	12+

The starting pool elevations shown were found by assuming the lake level was at the crest of the principal spillway at elevation 390.0 and then applying an appropriate antecedent storm four days prior to the storm being analyzed. The antecedent storm applied for analysis of the 10% PMF was 5% of the PMF, which is one-half as large as the storm being analyzed, as recommended in the Hydrologic/Hydraulic Standards prepared by the Corps of Engineers, St. Louis District. The antecedent storm raised the lake level to 392.7 and in four days outflow from the principal spillway had reduced the lake elevation to 390.9. The lake level also returned to elevation 390.9 following the antecedent storms for the 50% PMF and 100% PMF. No reduction in flow due to collection of debris around the pipe inlet was assumed. The trash rack is believed to be adequate to prevent clogging especially when the inlet is submerged. Even if the pipe inlet became clogged, the effect on the determination of the overtopping potential would be negligible. The principal spillway has a maximum capacity of 2.7 cfs with the lake level at the top of the dam.

Data for the 1 percent probability storm is presented in the table below.

Storm	Starting Pool Elevation (MSL)	Peak Inflow To Lake (cfs)	Maximum Pool Elevation (MSL)	Maximum Depth Over Dam (feet)	Peak Discharge (cfs)	Overtopping Duration (hour)
1% probability	390.0	626	396.15	0.25	18	9+

The starting elevation was assumed to be at the level of the principal spillway crest.

The dam will be overtopped by flood flows of less magnitude than the Spillway Design Flood. Overtopping of an earthen embankment could cause serious erosion and lead to failure of the structure. Flood discharges resulting from a failure of Burnett Lake Dam could be expected to produce substantial stage rises in the hazard zone. Overtopping would lead to potential loss of life and potential damage to State Route A.

SECTION 6 - STRUCTURAL STABILITY

6.1 EVALUATION OF STRUCTURAL STABILITY:

A. Visual Observations:

Observed features which could adversely affect the structural stability of this dam are discussed in Section 3 of this inspection report.

B. Design and Construction Data:

Design data for the embankment was unavailable. Some of the construction history of the dam was obtained and is given in Paragraph 1.2 G. Seepage and stability analysis comparable to the requirement of the inspection guidelines also were not available. This situation constitutes a deficiency which should be corrected.

C. Operating Records:

No operating records were available. The normal operating procedures were obtained from Mr. Burnett and are given in Paragraph 1.2 H.

D. Post-Construction Changes:

The emergency spillway channel was filled in by soil eroding from the hillside which forms its right slope and several years ago Mr. Burnett cleaned out the soil which had filled the channel. Since that time the channel has been filled with soil again. No other post-construction changes have occurred.

E. Seismic Stability:

This dam is located in Seismic Zone 3, as shown on the Seismic Zone Map on Plate 3 of Appendix A. Zone 3 delineates areas in which major damage would result from the expected seismic activity in this area. An accurate slope stability analysis with seismic loading cannot be made because of the lack of original design data and soil strength parameters. It should be noted that in the event of potential seismic loading, the slopes may become unstable and suffer some damage. The extent of damage would depend upon the intensity and duration of the seismic occurrence.

SECTION 7 - ASSESSMENT/REMEDIAL MEASURES

7.1 DAM ASSESSMENT:

A. Safety:

Several items were noted during the field inspection that could adversely affect the safety of the dam. These items are: (1) poor vegetal cover on the dam; (2) severe erosion problems including the blockage of the emergency spillway channel by eroded material; and (3) burrowing animals present on the dam.

Several items should be monitored and may need to be further investigated or repaired if their condition worsens. A small amount of flow was coming from the principal spillway pipe even though the lake level was below the crest. This indicates a possible crack or hole in the pipe in the embankment. The flow should be monitored for an increase or for muddy flow. An increase in flow or muddy flow would indicate deterioration of the pipe which could lead to serious damage to the embankment. Also possible seepage flows near the discharge scour hole should be monitored. A small amount of flow was coming from the drawdown pipe apparently due to leakage though the gate valve. If this flow increases substantially, corrective action should be taken.

Another deficiency was the lack of seepage and stability analyses. This deficiency should be corrected.

The dam will be overtopped by flows in excess of approximately 10 percent of the Probable Maximum Flood. Overtopping of an earthen embankment could cause serious erosion and could possibly lead to failure of the structure.

B. Adequacy of Information:

The conclusions in this report were based on the performance history as related by others, visual observation of external conditions, and data from available mapping. The inspection team considers that these data are sufficient to support the conclusions herein. Seepage and stability analyses comparable to the Recommended Guidelines for Safety Inspection of Dams were not available, which is considered a deficiency.

C. Urgency:

The remedial measures recommended in Paragraph 7.2 for the items concerning the safety of the dam noted in Paragraph 7.1A. should be accomplished in the near future. The deficiencies concerning spillway capacity and erosion should be given a high priority.

D. Necessity for Additional Inspection:

Based on the results of the Phase I inspection, additional periodic inspections are recommended.

7.2 REMEDIAL MEASURES:

The following remedial measures and maintenance procedures are recommended. All remedial measures should be performed under the guidance of a professional engineer experienced in the design and construction of dams.

A. Recommendations:

1. The hydraulic capability of this dam should be increased to hold and/or pass the recommended Spillway Design Flood which is 50 percent of the PMF. This is normally accomplished by one or more of the following alternative measures:

   a. Construction of additional erosion free spillway capacity.

   b. Provision for additional flood storage by:

      i. Increasing the height of the dam.

      ii. Permanently reducing the normal pool elevation.

2. A seepage and stability analysis comparable to the requirements of the recommended guidelines should be performed by an engineer experienced in the design and construction of dams. Since the dam is located in Seismic Zone 3, the analysis should include seismic loadings.

B. Operation and Maintenance Procedures:

1. The hillside which forms the right side of the emergency spillway should be stabilized. Also the downstream end of the emergency spillway should be protected from erosion.

2. Erosion gullies and holes on the dam should be repaired and reseeded.

3. The grass cover on the dam needs to be improved and then mowed regularly to promote a thick cover.

4. All burrowing animals should be removed or destroyed and their burrows filled and reseeded.

5. The dam should be monitored for further erosion in the future and repaired as necessary.

6. Any trees which begin growing on the dam should be removed.

7. Any debris which collects around the principal spillway inlet should be promptly removed.

8. The flow from the principal spillway should be monitored. If the flow increases or becomes murky or muddy while the lake level is below the crest, corrective action should be taken.

9. The flow from the drawdown pipe should be monitored and if it increases substantially corrective action should be taken.

10. The gate valve on the drawdown pipe should be maintained to keep it operable.

11. The dam should be periodically inspected by an experienced engineer and records kept of these inspections and maintenance efforts.

PHASE I INSPECTION REPORT

APPENDIX A

MAPS AND GENERAL DRAWINGS

APPENDIX A

MAPS AND GENERAL DRAWINGS

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Plate	Title
1	Location Map
2	Vicinity Map
3	Seismic Zone Map
4	Plan of Dam and Spillway
5	Cross Section of Dam

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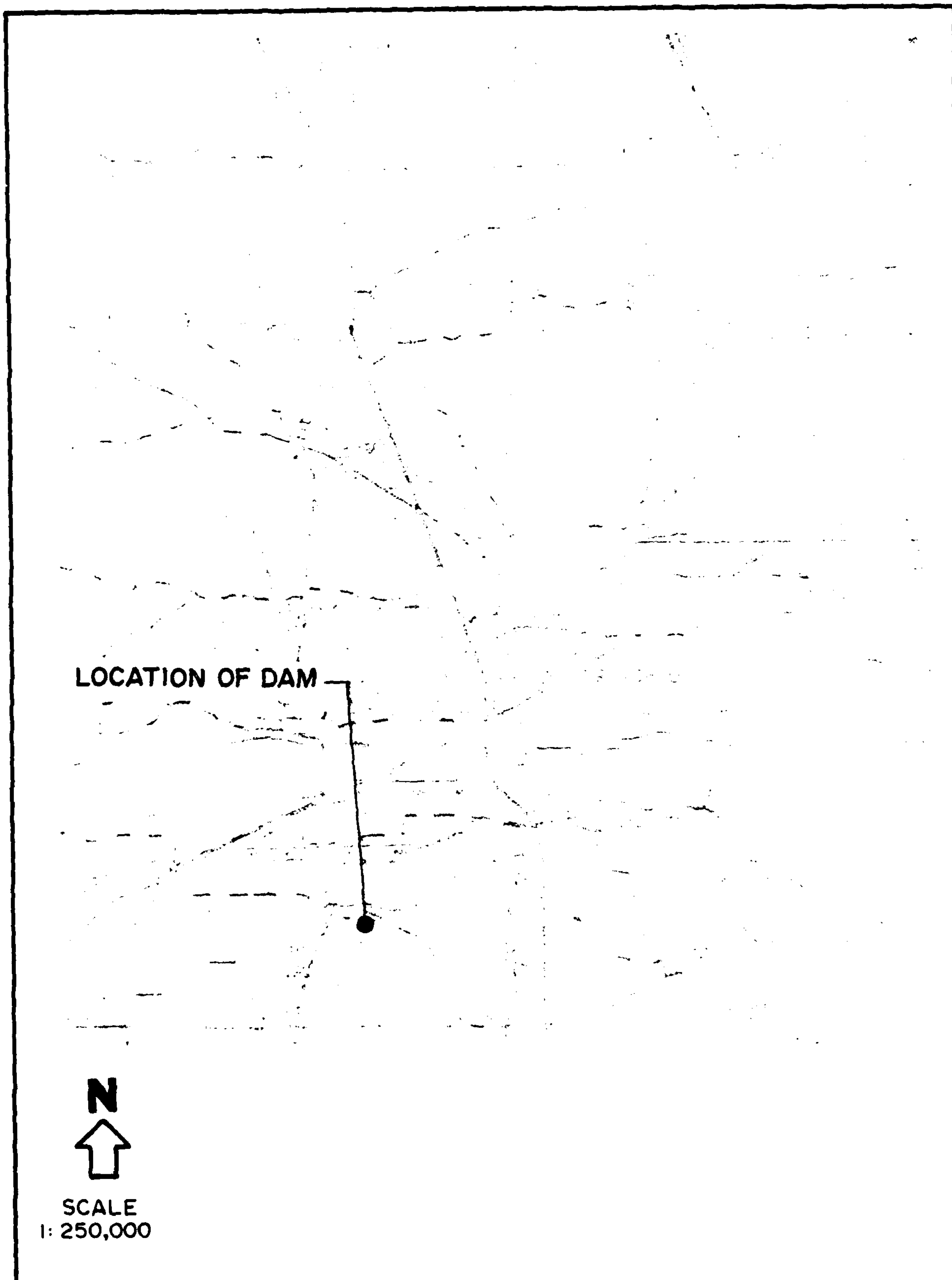
U.S. ARMY ENGINEER DISTRICT, ST. LOUIS
CORPS OF ENGINEERS
NATIONAL DAM SAFETY PROGRAM

LOCATION MAP

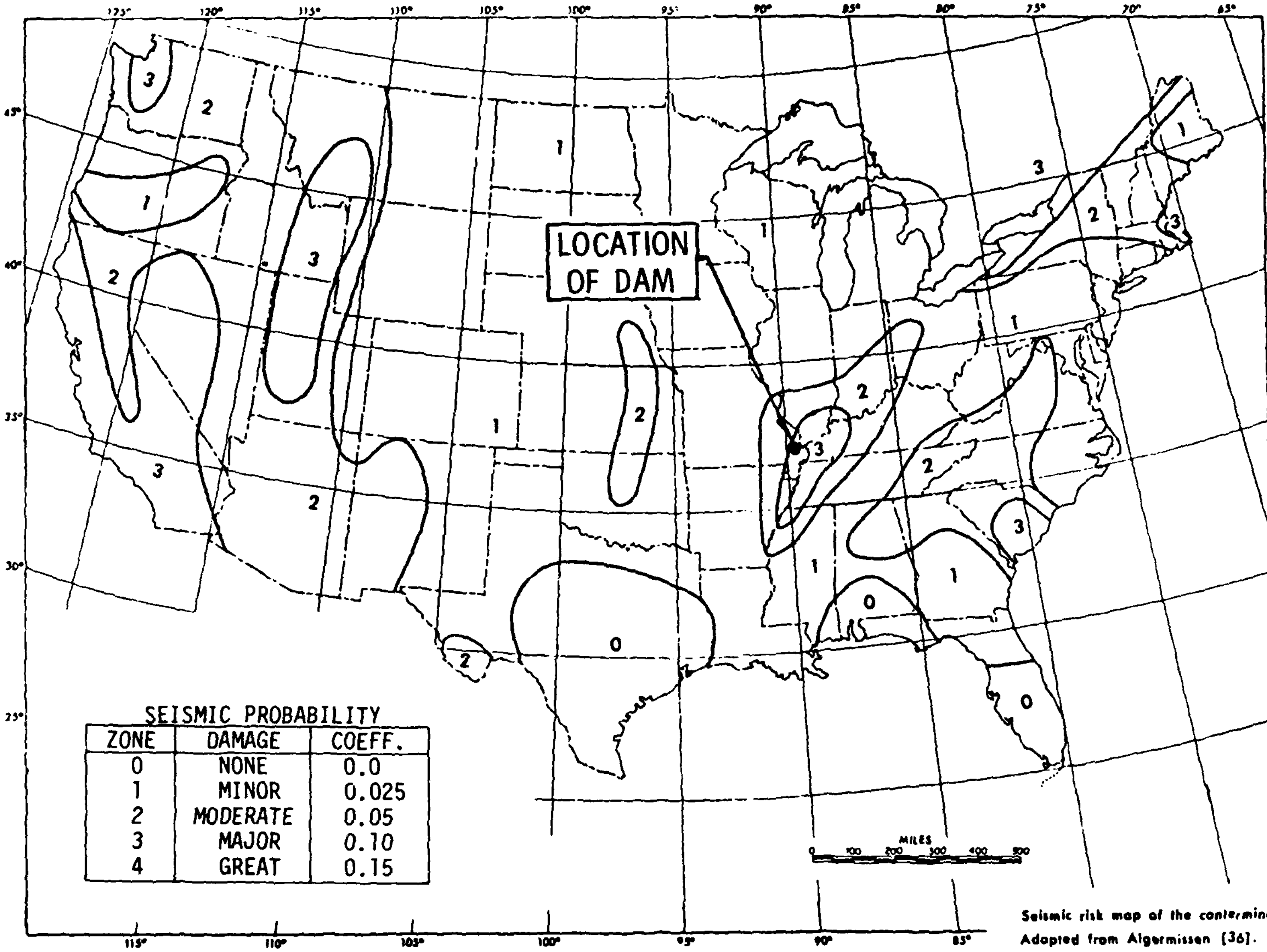
BURNETT LAKE DAM MO40069

PLATE I



CM&T	U.S. ARMY ENGINEER DISTRICT, ST. LOUIS CORPS OF ENGINEERS NATIONAL DAM SAFETY PROGRAM	VICINITY MAP BURNETT LAKE DAM MO40069

PLATE 2



SEISMIC PROBABILITY

ZONE	DAMAGE	COEFF.
0	NONE	0.0
1	MINOR	0.025
2	MODERATE	0.05
3	MAJOR	0.10
4	GREAT	0.15

Seismic risk map of the conterminous United States.
Adapted from Algermissen [36]. 288-D-2786.

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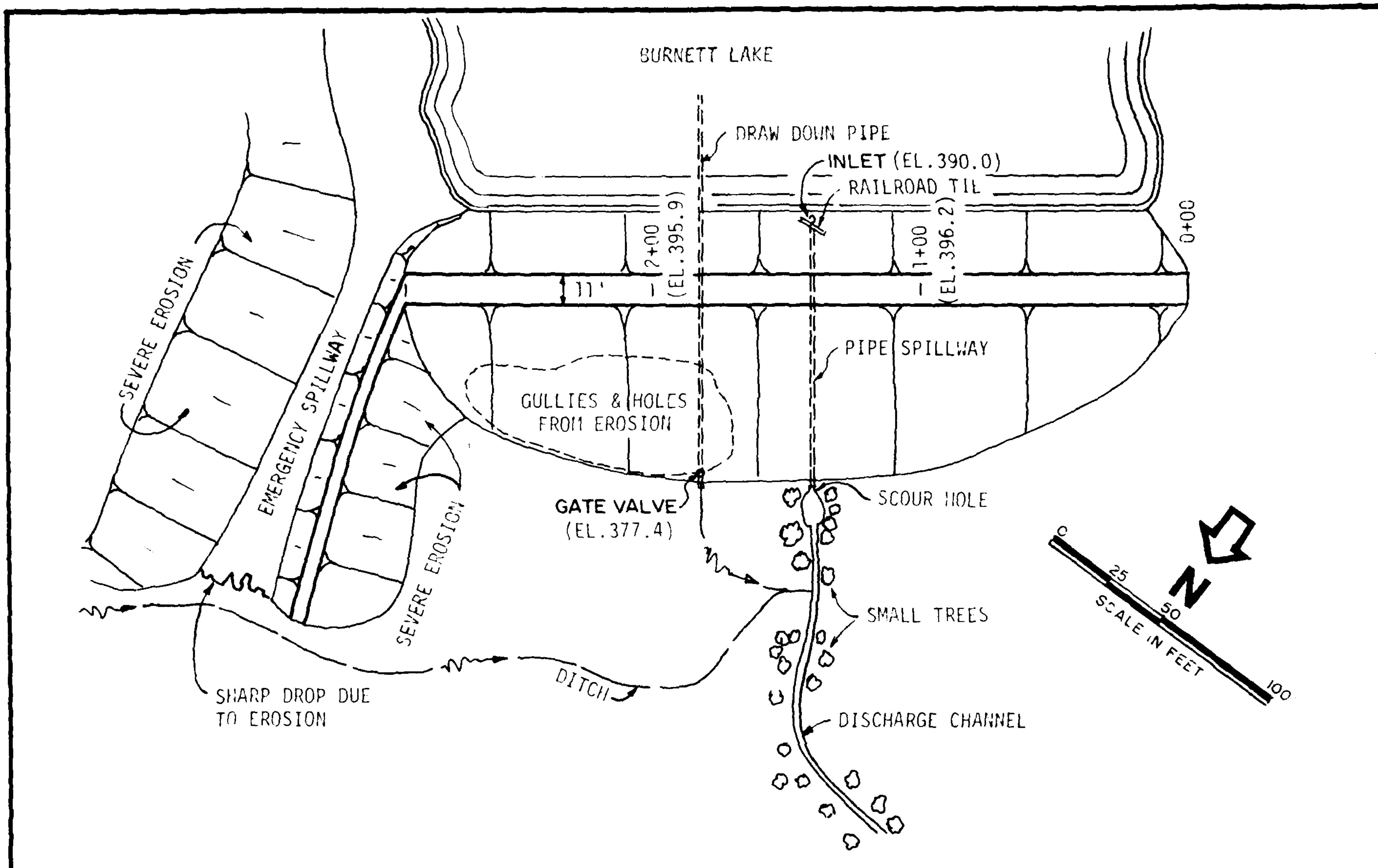
SEISMIC ZONE MAP OF CONTIGUOUS STATES
BURNETT LAKE DAM MO40069



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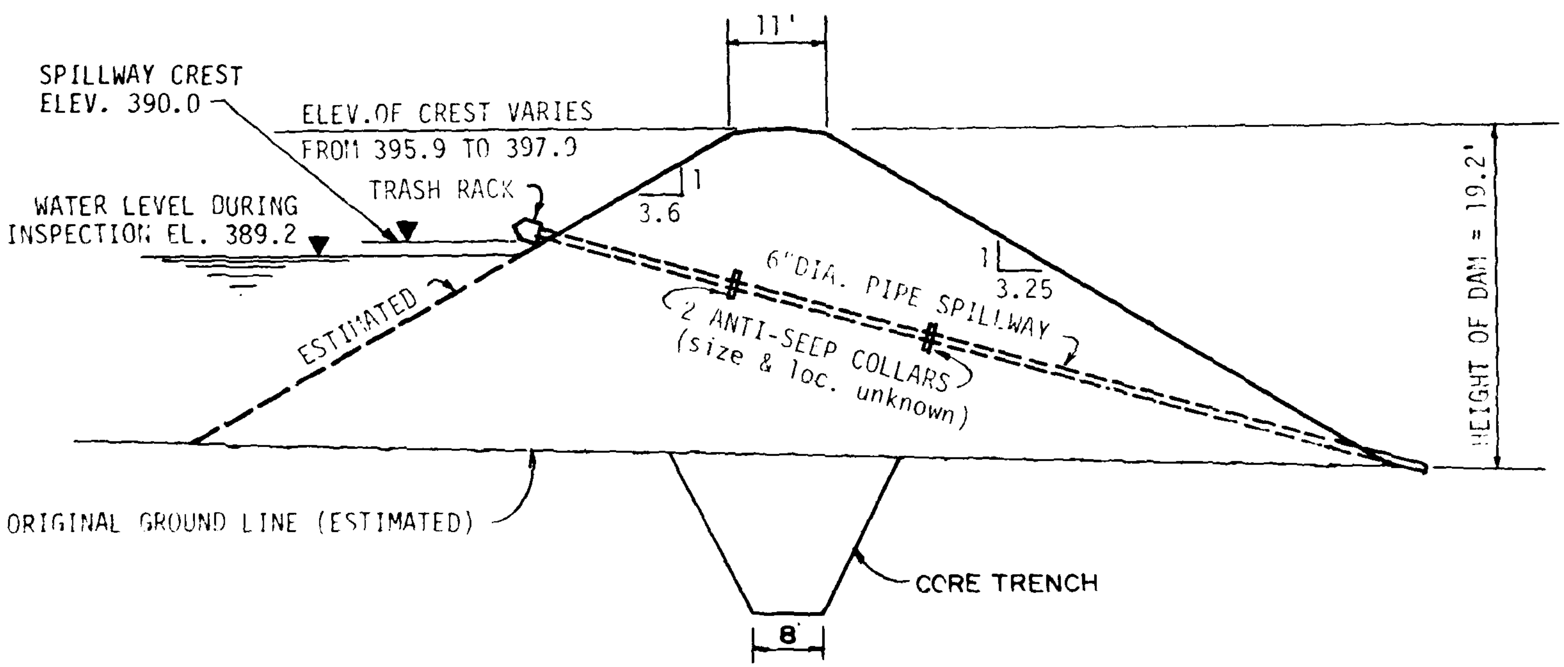
PLAN OF DAM AND SPILLWAY
BURNETT LAKE DAM MO. 40069

PLATE 4



CROSS SECTION OF DAM

APPROXIMATE SCALE
HORIZ. 1" = 20'
VERT. 1" = 10'

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PHASE I INSPECTION REPORT

APPENDIX B

HYDROLOGIC AND HYDRAULIC ANALYSIS

APPENDIX B

HYDROLOGIC AND HYDRAULIC ANALYSIS

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2	Elevation-Area-Capacity Relation
3	Profile of Dam Crest
4	Emergency Spillway Profile
5	Principal Spillway Inlet and Trash Rack Dimensions
6	HEC-1 Input Data for PMF Ratio Storms
7	HEC-1 Inflow and Outflow, 10% PMF
8	HEC-1 Inflow and Outflow, 50% PMF
9	HEC-1 Inflow and Outflow, 100% PMF
10	HEC-1 Summary Table, PMF Ratio Storms
11	HEC-1 Input Data for 1% Probability Storm
12	HEC-1 Inflow and Outflow, 1% Probability Storm
13	HEC-1 Summary Table, 1% Probability Storm

APPENDIX B

HYDROLOGIC AND HYDRAULIC ANALYSIS

A. PURPOSE:

The purpose of this Appendix is to present the methodology used and the results of the hydrologic and hydraulic analysis. The analysis was done according to criteria presented in the Recommended Guidelines for Safety Inspection of Dams and in the St. Louis District Hydrologic/Hydraulic Standards for Phase I Safety Inspection of Non-federal Dams dated 22 August 1980. The purpose of the analysis is to determine the overtopping potential for Burnett Lake Dam.

B. HYDROLOGIC AND HYDRAULIC ANALYSIS:

The hydrologic analysis used in development of the overtopping potential is based on applying a hypothetical storm to a unit hydrograph to obtain the inflow hydrograph for a reservoir routing. Data for determination of the unit hydrograph was obtained from the U.S. Geological Survey 7.5 minute quadrangle map for Chaffee, Missouri, dated 1963 and photo revised in 1978 and from the field inspection. A lake and watershed map is shown on Exhibit 1. The parameters used in the development of the unit hydrograph are presented in Table 1.

TABLE 1

UNIT HYDROGRAPH PARAMETERS

Drainage Area (A)	0.175	sq. miles
Length of Watercourse (L)	0.45	miles
Difference in Elevation (H)	145	feet
Time of Concentration (Tc)	0.15	hours
Lag Time (Lg)	0.09	hours
Time to Peak (Tp)	0.13	hours
Peak Discharge (Qp)	650	cfs
Duration (D) (smallest HEC-1 allows)	0.083	hours (5 minutes)

HEC-1 Unit Hydrograph

Time (Min.)	Discharge (cfs)
0	0
5	441
10	568
15	220
20	81
25	29
30	11
35	4
40	0

Formula Used:

$$Tc = \left[\frac{11.9\ L^3}{H}\right]^{0.385}$$ From "Design of Small Dams", 1973

$$Lg = 0.6\ Tc$$

$$Tp = \frac{D}{2} + Lg$$

$$Qp = \frac{484\ A \cdot Q}{Tp}$$ Q = Excess Runoff = 1 inch

The hypothetical storm that is applied to the unit hydrograph is the Probable Maximum Precipitation (PMP). It is derived and determined from regional charts prepared by the National Weather Service in "Hydrometeorological Report No. 33." No reduction factors have been applied to the PMP. A 24-hour storm duration is assumed with total depth distributed over 6-hour periods in accordance with procedures outlined in EM 1110-2-1411 (SPF determination). The maximum 6 hour rainfall period is then distributed to hourly increments by the same criteria. Within-the-hour distribution is based upon NOAA Technical Memorandum NWS HYDRO-35. The non-peak 6 hour rainfall periods are distributed uniformly. All distributed values are arranged in a critical sequence by the SPF. The final inflow hydrograph is produced by deduction of infiltration losses appropriate to the soil, land use, and antecedent moisture conditions. Soil information was obtained from mapping available from the Scott County Soil Conservation Service and land use and slopes were determined from the field inspection and available mapping and are presented in Section 3. Antecedent Moisture Condition III (AMC III) was used for the analysis of the PMP percentage storms.

A 1 percent probability storm was also analyzed. The rainfall amount and distribution for the 1 percent probability storm with a 24 hour duration for a drainage area of 0.5 square miles for the Cape Girardeau, Missouri area was obtained from the St. Louis District, Corps of Engineers and used for the analysis. Antecedent Moisture Condition III (AMC III) was used for the analysis of the 1 percent probability storm. The rainfall applied, the parameters used to determine infiltration losses and the resulting runoffs are presented in Table 2.

TABLE 2

RAINFALL-RUNOFF PARAMETERS

Selected Storm Event	Storm Duration (hours)	Rainfall (inches)	Runoff (inches)	Losses (inches)
PMP	24	35.10	32.28	2.82
1% Probability Storm	24	7.08	4.81	2.28

Additional Data:

1. Soil Conservation Service Runoff Curve Number CN = 79 (AMC III).
2. Percentage of Drainage Basin Impervious = 6 percent.

The reservoir routing is accomplished by using the Modified Puls routing technique in which the flood hydrograph is routed through lake storage. The hydraulic capacity of the spillway and the crest of the dam are used as outlet controls in the routing. Storage in the pool area is defined by an elevation-storage capacity curve. The hydraulic capacity of the spillway and top of the dam are defined by elevation-discharge curves.

The elevation-storage capacity curve was developed by determining the lake surface area at various elevations using available mapping and then inputting this information to the HEC-1 computer program. The computer program then developed an elevation-storage capacity curve using the conic method. An Elevation-Area-Capacity curve is shown on Exhibit 2.

For the overtopping analysis the top of the dam is the lower of the following elevations: (1) The minimum elevation of embankment as determined by simple field surveys. (2) The lake elevation at which corresponding outflow velocities, as determined from simple hydraulic formula, exceed the suggested maximum permissible mean channel velocities. The top of the dam was determined to be 395.9 which is the minimum elevation of the embankment. Since the emergency spillway channel has been filled in to an elevation greater than the top of the embankment, outflow through the channel does not occur before overtopping of the embankment begins.

The elevation-discharge capacity curve for the top of the dam was developed using the non-level crest option of the HEC-1 computer program. The emergency spillway was included in the length of the dam since no emergency spillway discharge curve was input to the computer. The program assumes critical flow over a broad-crested weir and uses the formula $Q = CLH^{1.5}$. The coefficient C was chosen to be 2.6 as found in Handbook of Hydraulics by Horace Williams King and Ernest F. Brater. A profile of the dam crest is given in Exhibit 3 and an emergency spillway flowline is given on Exhibit 4.

The hydraulic capacity of the principal spillway was determined using a formula and coefficient for orifice control found in Handbook of Hydraulics by Horace Williams King and Ernest F. Brater. The dimensions of the inlet end of the spillway and the trash rack which surrounds it are shown on Exhibit 5 and they can be seen on Photograph 5 in Appendix C. The flow through the trash rack was assumed to be adequate so that the capacity of the principal spillway was not reduced. The elevation-principal spillway capacity data input to the computer and the formula used to determine the capacity are shown in Table 3.

TABLE 3

LAKE ELEVATION VS. PRINCIPAL SPILLWAY CAPACITY

VALUES INPUT TO THE HEC-1 COMPUTER PROGRAM

Lake Elevation (MSL)	Principal Spillway Capacity (cfs)
390.0	0
391.0	1.0
392.0	1.5
394.0	2.1
396.0	2.7
398.0	3.1

Orifice control formula - $Q = CA(2gh)^{0.5}$ $C = 0.7$

The dam overtopping analysis has been conducted by hydrologic methods for this dam and lake. This analysis determines the percentage of the PMF hydrograph that the reservoir can contain without the dam being effectively overtopped. According to Hydrologic/Hydraulic Standards developed by the Corps of Engineers, St. Louis District, an antecedent storm should be applied to the watershed before analysis of the PMF. The antecedent storm precedes the storm being analyzed by 4 days. The starting elevation at the beginning of the antecedent storm was assumed to be at the elevation of the principal spillway crest. The antecedent storm for the analysis of the PMF ratio storms is a storm half the magnitude of the storm being analyzed. The antecedent storm for the 10% PMF was 5% of the PMF which caused the lake level to rise to an elevation of 392.7 and after 4 days outflow from the principal spillway had reduced the lake elevation to 390.9. This was used as the starting elevation for the analysis of the 10% PMF. The lake level also returned to elevation 390.9 following the antecedent storms for the 50% PMF and 100% PMF.

The antecedent storm for the analysis of the 1% probability storm is the rainfall in the 24 hours preceding the peak 24-hour period assuming a 48-hour duration. The computer program is only able to model a 24-hour storm when the time interval is 5 minutes, as it was for this analysis. Therefore, for the analysis of Burnett Lake Dam, the antecedent rainfall was assumed to infiltrate and result in the AMC III used for the analysis of the peak 24 hours and the starting elevation of the lake was assumed to be 390.0.

The above methodology has been accomplished for this report using the systemized computer program HEC-1 (Dam Safety Version), July 1978, prepared by the Hydrologic Engineering Center, U.S. Army Corps of Engineers, Davis, California. The numeric parameters estimated for this site and input to the program are listed on Exhibit 6 for the PMF Ratio Storms and on Exhibit 11 for the 1% probability storm. Definitions of these variables are contained in the "User's Manual" for the computer program.

The computer printout of the inflow to the lake and outflow from the lake for the 10% PMF, 50% PMF, 100% PMF, and 1% probability storm are presented on Exhibits 7, 8, 9 and 12, respectively. The computer printout summary table for the PMF ratio storms is presented on Exhibit 10 and the summary table for the 1% probability storm is presented on Exhibit 13.

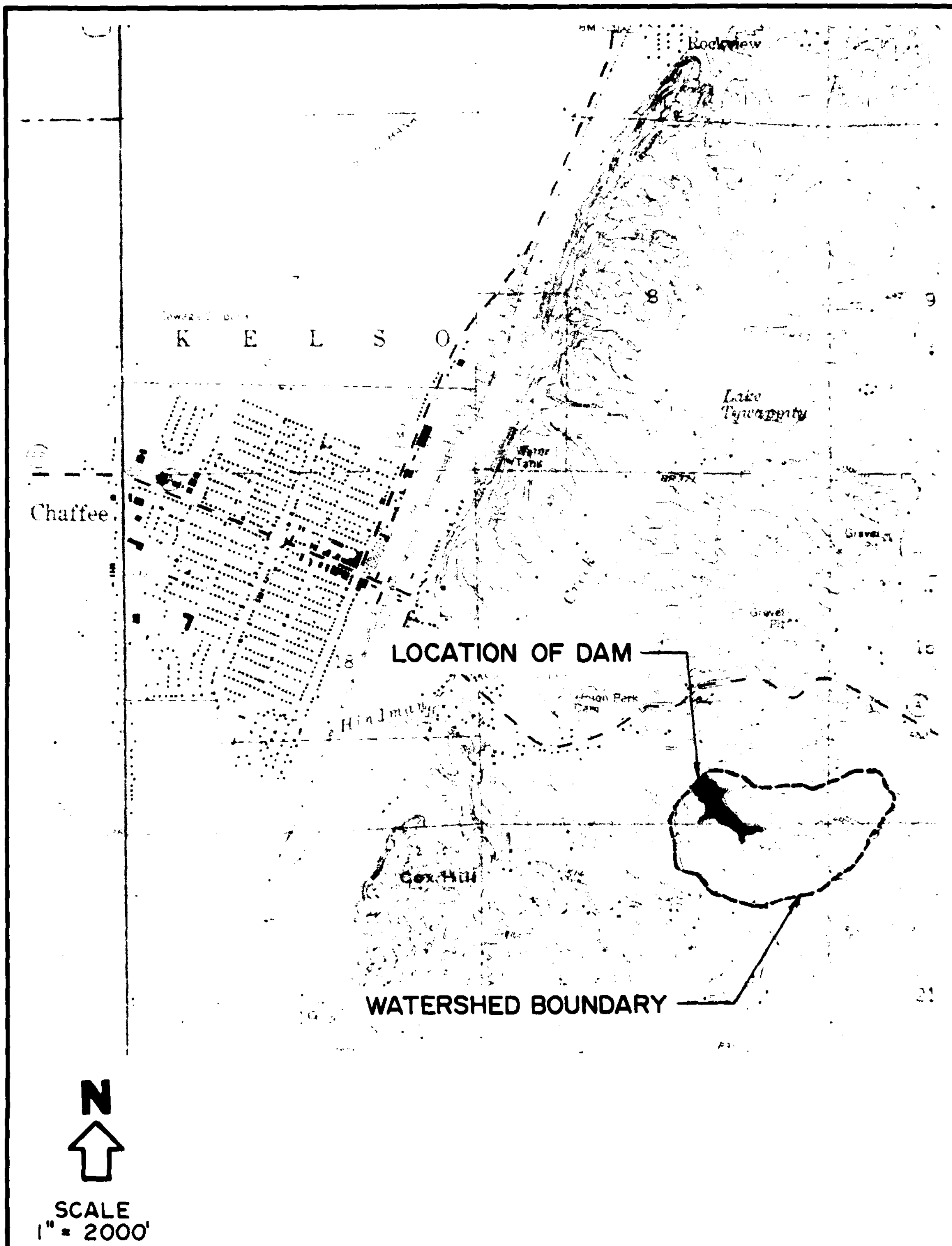
C. REFERENCES:

a. Design of Small Dams, United States Department of the Interior, Bureau of Reclamation, Second Edition, 1973.

b. Flood Hydrograph Package (HEC-1), Users Manual for Dam Safety Investigations, The Hydrologic Engineering Center, U.S. Army Corps of Engineers, Davis, California; September, 1978.

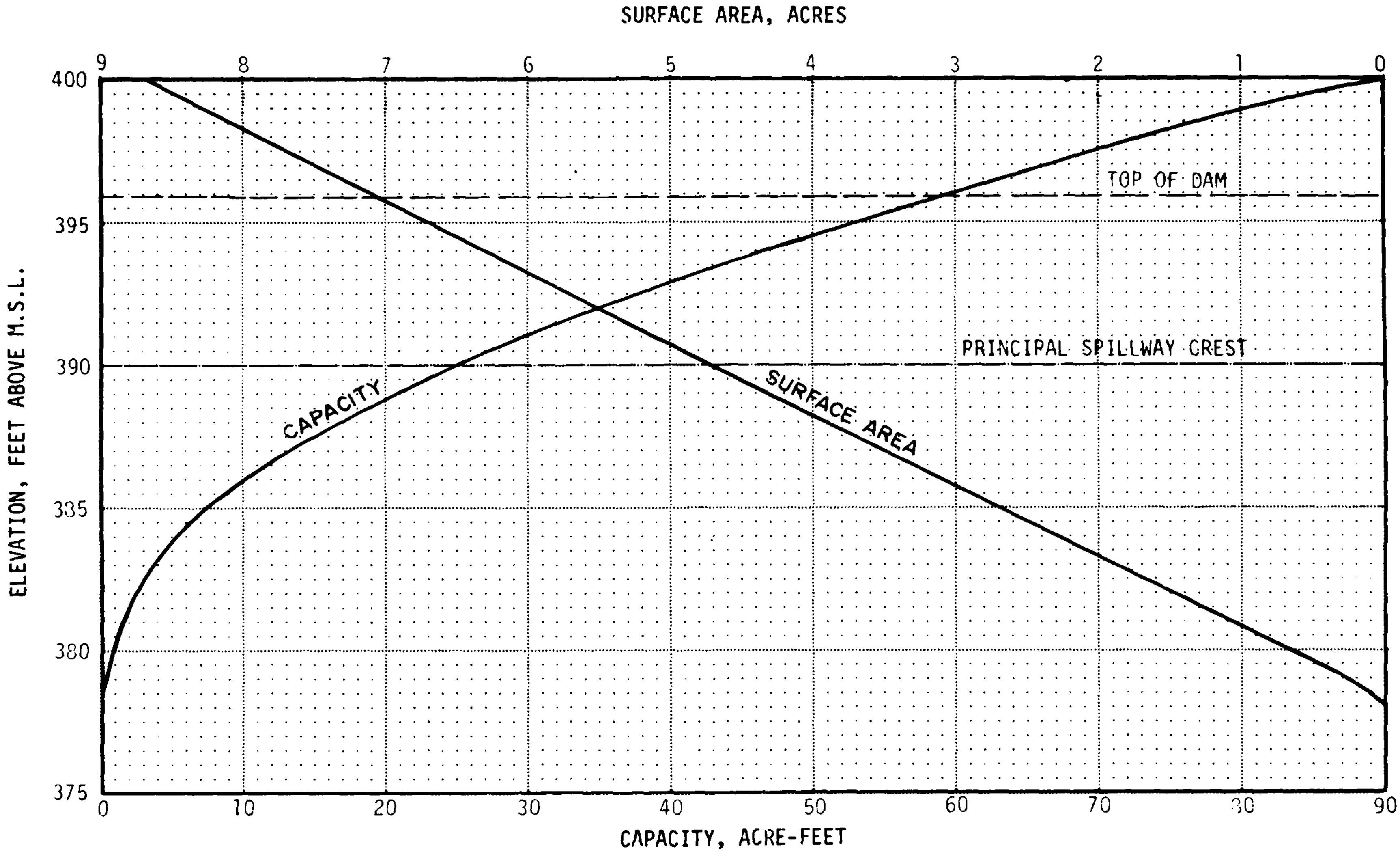
c. King, Horace Williams, Brater, Ernest F., Handbook of Hydraulics, Fifth Edition, 1963.

d. Riedel, J.T., Appleby, J.F., and Schloemer, R. W., Seasonal Variation of the Probable Maximum Precipitation East of the 105th Meridian for Areas from 10 to 1000 Square Miles and Durations of 6, 12, 24 and 48 Hours, Hydrometerorological Report No. 33, U.S. Department of Commerce, Weather Bureau, April, 1956.



CM&T	U.S. ARMY ENGINEER DISTRICT, ST. LOUIS CORPS OF ENGINEERS NATIONAL DAM SAFETY PROGRAM	LAKE & WATERSHED MAP BURNETT LAKE DAM MO40069

EXHIBIT 1



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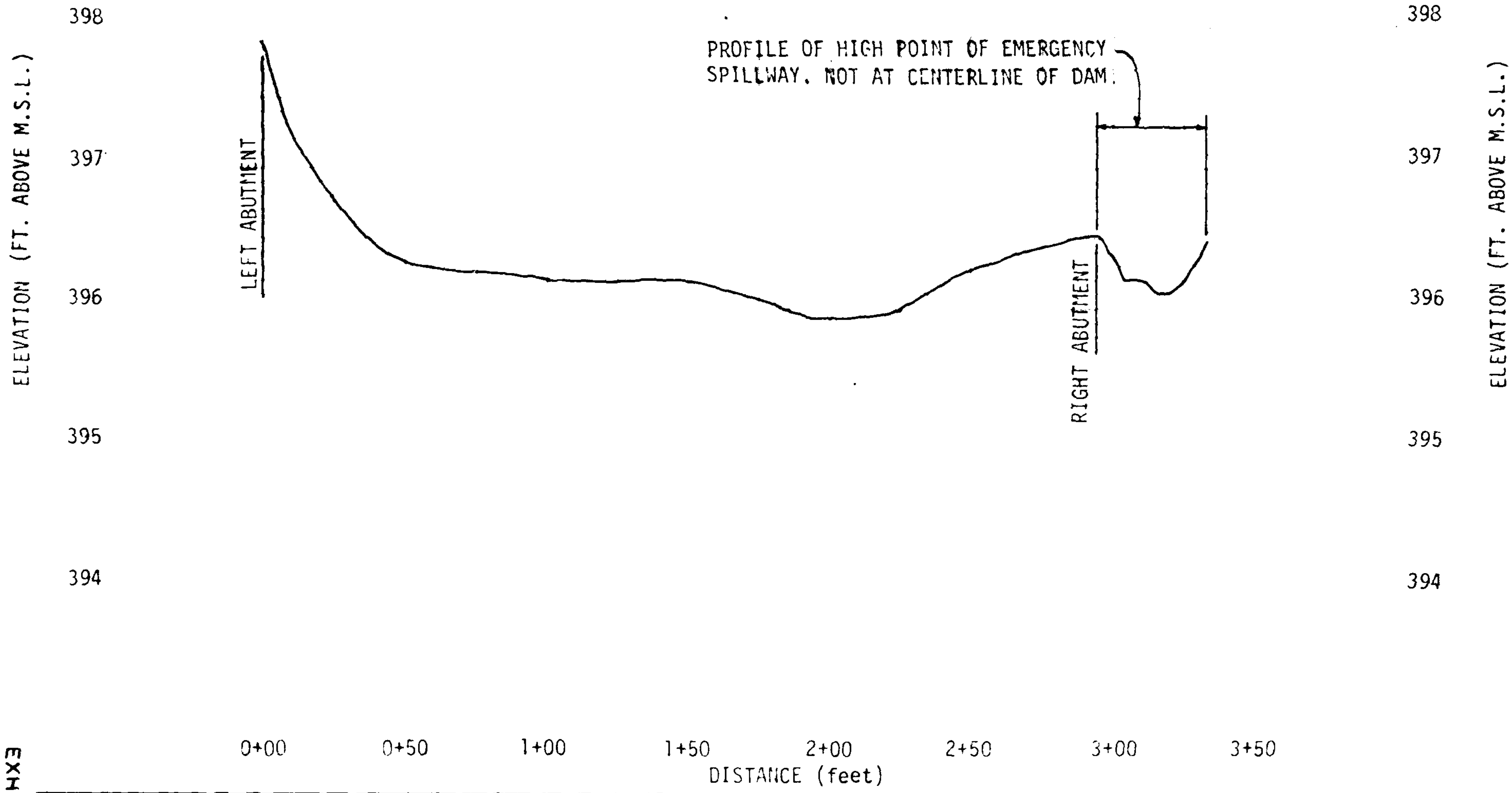
CORPS OF ENGINEERS
NATIONAL DAM SAFETY PROGRAM

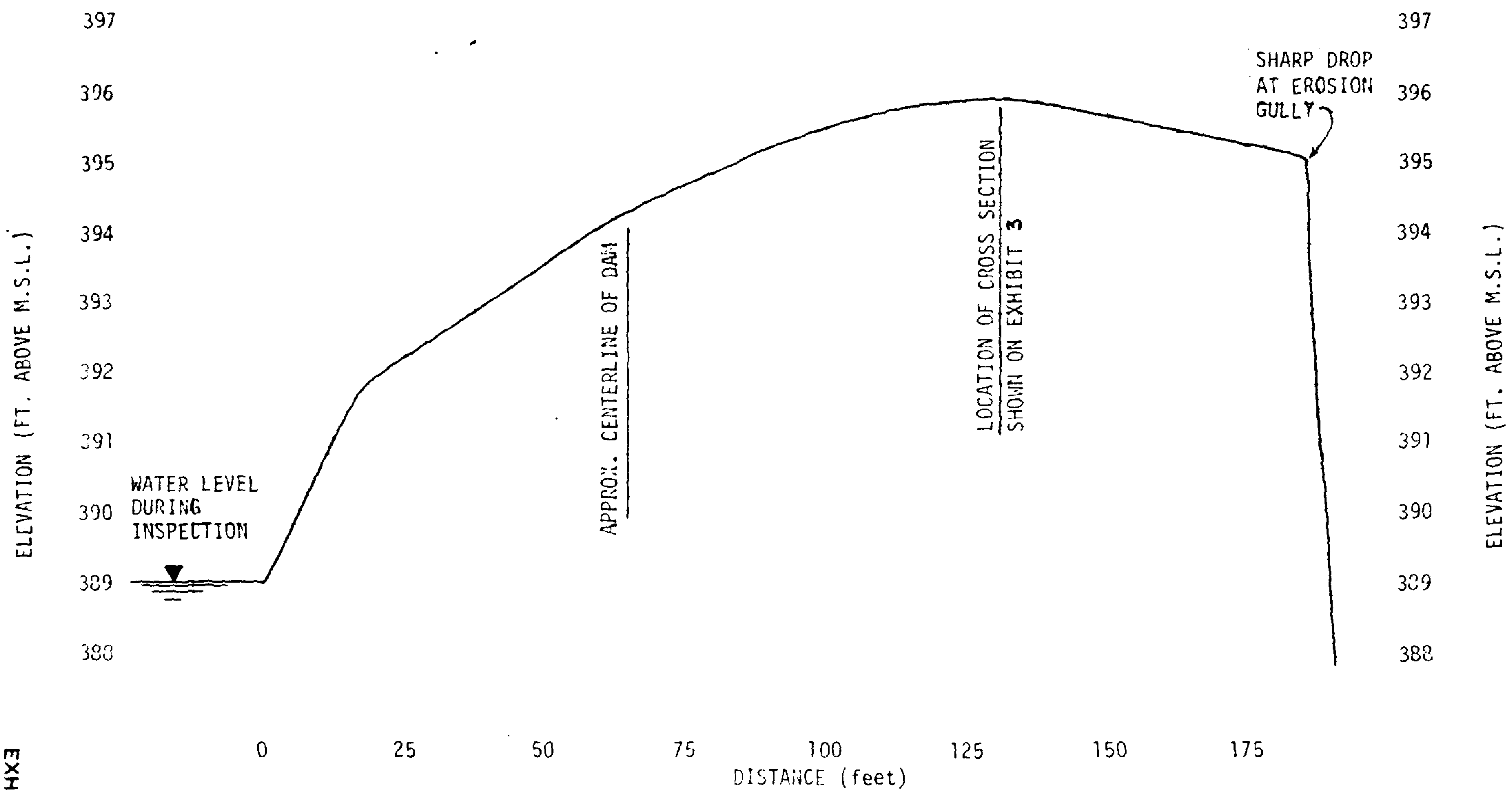
ELEVATION - AREA - CAPACITY RELATION
BURNETT LAKE DAM MO. 40069

EXHIBIT 2



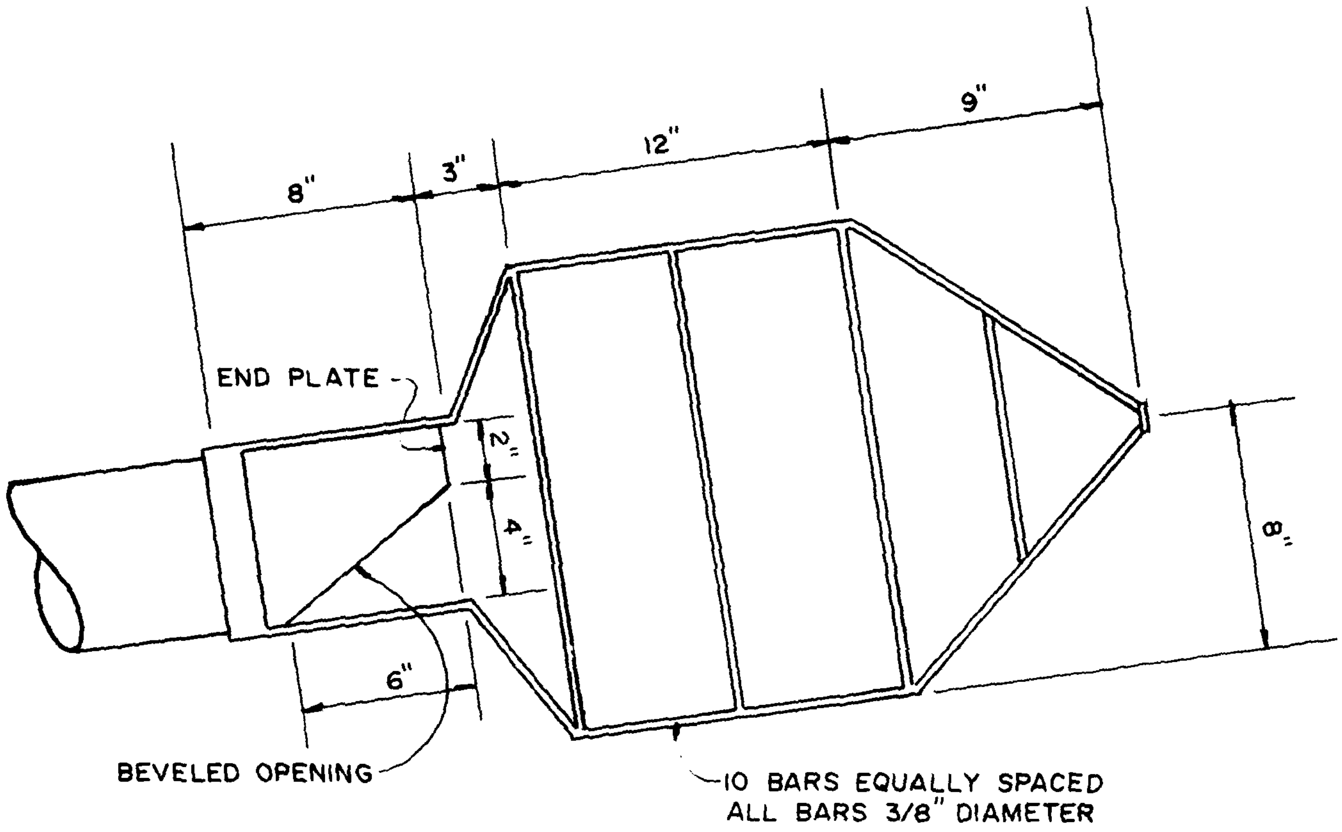
CRAWFORD MURPHY & TILLY, Inc. Consulting Engineers SPRINGFIELD, IL • LINCOLN, IL • AURORA, IL	U.S. ARMY ENGINEER DISTRICT, ST. LOUIS CORPS OF ENGINEERS NATIONAL DAM SAFETY PROGRAM	PROFILE OF DAM CREST BURNETT LAKE DAM MO. 40069

EXHIBIT 3



CRAWFORD MURPHY & TILLY inc. Consulting Engineers SPRINGFIELD, IL • LINCOLN, IL • AURORA, IL	U.S. ARMY ENGINEER DISTRICT, ST. LOUIS CORPS OF ENGINEERS NATIONAL DAM SAFETY PROGRAM	EMERGENCY SPILLWAY PROFILE BURNETT LAKE DAM MO. 40069

EXHIBIT 4



SCALE 1" = 6"

CRAWFORD MURPHY & TILLY, inc. Consulting Engineers SPRINGFIELD, IL • LINCOLN, IL • AURORA, IL	U.S. ARMY ENGINEER DISTRICT, ST. LOUIS CORPS OF ENGINEERS NATIONAL DAM SAFETY PROGRAM	BURNETT LAKE DAM MO40069 PRINCIPAL SPILLWAY AND TRASH RACK DIMENSIONS

EXHIBIT 5

```
A1 HYDROLOGIC/HYDRAULIC ANALYSIS    BURNETT LAKE DAM(MO 40069), SCOTT COUNTY, MO
A2 NATIONAL DAM SAFETY PROGRAM  - CORPS OF ENGINEERS, ST. LOUIS DISTRICT
A3 CMRT JOB NO. 8034 02                  JANUARY 7, 1981
B     788       0       5       0       0       0       0       0       [illegible]       0
B1      5
J       1       9       1
J1   0.05    0.08    0.09    0.10    0.11    0.12    0.15    0.50     1.0
K       0   INFLOW                                      1
K1  INFLOW HYDROGRAPH COMPUTATION
M       1       2   0.175                       1                       1
P       0    27.0     102     120     130
T                                                       -1     -79              0.06
WP           0.092
X       0    -0.1    1.75
K       1    LAKE                                       1
K1  RESERVOIR ROUTING BY MODIFIED PULS METHOD
Y                                   1       1
Y1      1                                           390.9       1
Y4  390.0   391.0   [illegible]   [illegible]   [illegible]   [illegible]
Y5      0     1.0     1.5     2.1     2.7     3.1
$A      0     0.7     4.7     8.7
$L  [illegible]     380     390     400
$$  390.0
$D  [illegible]     2.6     1.5     [illegible]
$I      0      40      70     160     210     300     340     [illegible]
$V  [illegible]   [illegible]   [illegible]   [illegible]   [illegible]   [illegible]   [illegible]   [illegible]
K      [illegible]
```

CMT	U.S. ARMY ENGINEER DISTRICT, ST. LOUIS CORPS OF ENGINEERS NATIONAL DAM SAFETY PROGRAM	INPUT DATA FOR PMF RATIO STORMS BURNETT LAKE DAM MO40069

EXHIBIT 6

HYDROGRAPH AT STAINFLOW FOR PLAN 1, RTIO 4

0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
0.	0.	0.	0.	0.	0.	0.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	2.	3.	3.	4.	4.	4.	4.	5.
5.	5.	5.	5.	5.	5.	6.	6.	6.	6.
6.	6.	6.	6.	6.	6.	6.	7.	7.	7.
7.	7.	7.	7.	7.	7.	7.	7.	7.	7.
7.	7.	7.	7.	7.	7.	8.	8.	8.	8.
8.	8.	8.	8.	8.	8.	8.	8.	8.	8.
8.	8.	8.	8.	8.	8.	8.	8.	8.	8.
8.	8.	8.	8.	15.	23.	26.	28.	28.	29.
29.	29.	29.	29.	29.	29.	31.	34.	35.	35.
35.	36.	36.	36.	36.	36.	36.	36.	39.	43.
44.	45.	45.	45.	45.	45.	46.	46.	46.	46.
40.	41.	50.	63.	80.	137.	250.	262.	178.	123.
90.	69.	56.	48.	45.	44.	43.	43.	43.	43.
43.	43.	43.	43.	40.	36.	35.	34.	34.	34.
34.	34.	34.	34.	34.	34.	26.	24.	23.	22.
21.	20.	18.	17.	17.	16.	15.	14.	13.	12.
12.	11.	11.	10.	9.	9.	8.	8.	8.	7.
7.	6.	6.	6.	5.	5.	5.	5.	4.	4.
4.	4.	3.	3.	3.	3.	3.	3.	3.	3.
3.	3.	3.	3.	3.	3.	3.	3.	3.	3.
3.	3.	3.	3.	3.	3.	3.	3.	3.	3.
3.	3.	3.	3.	3.	3.	3.	3.		

STATION LAKE, PLAN 1, RATIO 4

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
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1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	2.	2.	2.	2.	2.	2.	2.	2.	2.
2.	2.	2.	2.	2.	2.	2.	2.	2.	2.
2.	2.	2.	2.	2.	2.	2.	2.	2.	2.
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3.	3.	3.	3.	3.	3.	3.	3.	3.	3.
3.	3.	3.	3.	3.	3.	3.	3.	3.	3.
3.	3.	3.	3.	3.	3.	3.	3.	3.	3.
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3.	3.	3.	3.	3.	3.	3.	3.	3.	3.
3.	3.	3.	3.	3.	3.	3.	3.	3.	3.
3.	3.	3.	3.	3.	3.	3.	3.		

CM&T	U.S. ARMY ENGINEER DISTRICT, ST. LOUIS CORPS OF ENGINEERS NATIONAL DAM SAFETY PROGRAM	INFLOW AND OUTFLOW 10% PMF BURNETT LAKE DAM MO40069

EXHIBIT 7

HYDROGRAPH AT STAINFLOW FOR PLAN 1, RTIO 8

0.	0.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	2.	2.	2.	2.	2.
2.	2.	2.	2.	2.	2.	2.	3.	3.	3.
3.	3.	3.	3.	3.	3.	3.	3.	3.	3.
3.	3.	8.	14.	17.	19.	20.	21.	22.	23.
24.	24.	25.	26.	27.	27.	28.	28.	29.	29.
30.	30.	31.	31.	32.	32.	32.	33.	33.	34.
34.	34.	34.	35.	35.	35.	36.	36.	36.	36.
36.	37.	37.	37.	37.	37.	38.	38.	38.	38.
38.	38.	39.	39.	39.	39.	39.	39.	39.	40.
40.	40.	40.	40.	40.	40.	40.	40.	40.	41.
41.	41.	41.	41.	73.	115.	132.	138.	141.	143.
143.	144.	145.	145.	146.	146.	156.	169.	174.	176.
177.	178.	178.	179.	179.	179.	180.	180.	195.	214.
222.	225.	226.	227.	227.	227.	228.	228.	228.	228.
199.	207.	251.	314.	402.	684.	1250.	1308.	888.	617.
448.	343.	282.	239.	224.	219.	217.	216.	210.	210.
216.	216.	216.	216.	201.	182.	174.	171.	170.	170.
170.	170.	170.	170.	170.	170.	129.	122.	116.	109.
103.	98.	92.	87.	83.	78.	74.	70.	66.	62.
59.	56.	53.	50.	47.	45.	42.	40.	38.	36.
34.	32.	30.	29.	27.	25.	24.	23.	22.	20.
19.	18.	17.	16.	15.	15.	15.	15.	15.	15.
15.	15.	15.	15.	15.	15.	15.	15.	15.	15
15.	15.	15.	15.	15.	15.	15.	15.	15.	15
15.	15.	15.	15.	15.	15.	15.	15.		

STATION LAKE, PLAN 1, RATIO 8

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	2.	2.	2.	2.	2.	2.	2.
2.	2.	2.	2.	2.	2.	2.	2.	2.	2.
2.	2.	2.	2.	2.	2.	2.	2.	2.	2.
2.	2.	2.	2.	2.	2.	2.	2.	2.	2.
2.	2.	2.	2.	2.	2.	2.	2.	2.	2.
2.	2.	2.	2.	2.	3.	3.	3.	3.	3.
34.	78.	118.	146.	162.	170.	175.	177.	187.	194.
207.	216.	221.	224.	226.	226.	227.	227.	228.	228.
220.	211.	221.	256.	318.	467.	842.	1206.	1114.	1017.
599.	454.	359.	297.	257.	237.	226.	221.	218.	217.
217.	216.	216.	210.	212.	201.	189.	181.	176.	173.
172.	171.	170.	170.	170.	170.	160.	144.	133.	124.
116.	110.	104.	98.	93.	88.	84.	80.	76.	72.
68.	65.	61.	58.	55.	53.	50.	48.	45.	43.
41.	39.	37.	35.	34.	32.	30.	29.	28.	26.
25.	24.	23.	22.	21.	20.	19.	19.	18.	18.
17.	17.	17.	17.	16.	16.	16.	16.	16.	16.
16.	16.	16.	16.	16.	15.	15.	15.	15.	15.
15.	15.	15.	15.	15.	15.	15.	15.		

U.S. ARMY ENGINEER DISTRICT, ST. LOUIS
CORPS OF ENGINEERS
NATIONAL DAM SAFETY PROGRAM

INFLOW AND OUTFLOW 50% PMF
BURNETT LAKE DAM MO40069

EXHIBIT 8

HYDROGRAPH AT STAINFLOW FOR PLAN 1, RTIO 9

0.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	2.	2.
2.	2.	2.	3.	3.	3.	3.	3.	4.	4.
4.	4.	4.	4.	5.	5.	5.	5.	5.	5.
6.	6.	6.	6.	6.	6.	6.	6.	7.	7.
7.	7.	16.	28.	34.	37.	40.	42.	44.	46.
47.	49.	50.	52.	53.	54.	55.	57.	58.	59.
60.	61.	62.	63.	63.	64.	65.	66.	66.	67.
68.	68.	69.	69.	70.	71.	71.	72.	72.	73.
73.	73.	74.	74.	75.	75.	75.	76.	76.	76.
77.	77.	77.	78.	78.	78.	78.	79.	79.	79.
79.	80.	80.	80.	80.	80.	81.	81.	81.	81.
81.	82.	82.	82.	146.	230.	263.	277.	282.	285.
287.	288.	289.	290.	291.	292.	312.	337.	348.	352.
354.	356.	357.	357.	358.	359.	359.	360.	390.	428.
443.	449.	452.	453.	454.	455.	455.	456.	456.	456.
398.	414.	502.	628.	803.	1368.	2500.	2616.	1777.	1234.
895.	686.	564.	478.	447.	437.	433.	432.	432.	432.
432.	432.	432.	432.	402.	363.	348.	343.	341.	340.
340.	340.	340.	340.	340.	340.	258.	244.	231.	218.
207.	195.	185.	175.	165.	156.	148.	140.	132.	125.
118.	112.	106.	100.	94.	89.	84.	80.	75.	71.
67.	64.	60.	57.	54.	51.	48.	46.	43.	41.
39.	36.	34.	33.	31.	30.	30.	30.	30.	30.
30.	30.	30.	30.	30.	30.	30.	30.	30.	30.
30.	30.	30.	30.	30.	30.	30.	30.	30.	30.
30.	30.	30.	30.	30.	30.	30.	30.		

STATION LAKE, PLAN 1, RATIO 9

END-OF-PERIOD HYDROGRAPH ORDINATES

OUTFLOW

1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	1.	1.
1.	1.	1.	1.	1.	1.	1.	1.	2.	2.
2.	2.	2.	2.	2.	2.	2.	2.	2.	2.
2.	2.	2.	2.	2.	2.	2.	2.	2.	2.
2.	2.	2.	2.	2.	2.	2.	2.	2.	2.
2.	2.	2.	2.	2.	2.	2.	2.	2.	2.
2.	3.	3.	3.	3.	3.	3.	3.	3.	6.
12.	21.	33.	45.	67.	114.	177.	228.	257.	273.
281.	285.	287.	289.	290.	291.	297.	314.	332.	349.
350.	353.	355.	356.	357.	358.	359.	359.	369.	395.
422.	438.	447.	451.	453.	454.	455.	455.	456.	456.
437.	417.	444.	529.	666.	1000.	1827.	2570.	2204.	1550.
1124.	849.	674.	560.	491.	458.	443.	436.	434.	433.
432.	432.	432.	432.	422.	396.	370.	355.	347.	343.
341.	340.	340.	340.	340.	340.	315.	276.	254.	237.
224.	211.	200.	189.	179.	170.	161.	153.	145.	137.
130.	124.	117.	111.	105.	100.	95.	90.	86.	81.
77.	73.	69.	66.	63.	59.	57.	54.	51.	49.
46.	44.	42.	40.	38.	36.	35.	34.	33.	32.
32.	32.	31.	31.	31.	31.	31.	31.	31.	31.
30.	30.	30.	30.	30.	30.	30.	30.	30.	30.
30.	30.	30.	30.	30.	30.	30.	30.		

CMT

U.S. ARMY ENGINEER DISTRICT, ST. LOUIS
CORPS OF ENGINEERS
NATIONAL DAM SAFETY PROGRAM

INFLOW AND OUTFLOW 100% PMF
BURNETT LAKE DAM MO40069

EXHIBIT 9

PEAK FLOW AND STORAGE (END OF PERIOD) SUMMARY FOR MULTIPLE PLAN RATIO ECONOMIC COMPUTATIONS
FLOWS IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES (SQUARE KILOMETERS)

RATIOS APPLIED TO FLOWS

OPERATION	STATION	AREA	PLAN	RATIO 1 .05	RATIO 2 .08	RATIO 3 .09	RATIO 4 .10	RATIO 5 .11	RATIO 6 .12	RATIO 7 .15	RATIO 8 .50	RATIO 9 1.00
HYDROGRAPH AT	INFLOW	.18	1	131.	209.	235.	262.	288.	314.	392.	1308.	2616.
	(	.45)	(	3.70)(	5.93)(	6.67)(	7.41)(	8.15)(	8.89)(	11.11)(	37.04)(	74.07)
ROUTED TO	LAKE	.18	1	2.	2.	2.	3.	8.	25.	63.	1206.	2530.
	(	.45)	(	.05)(	.07)(	.07)(	.07)(	.23)(	.71)(	1.80)(	34.14)(	71.65)

1

SUMMARY OF DAM SAFETY ANALYSIS

PLAN 1 ....

	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	390.90	390.00	395.90
STORAGE	29.	25.	59.
OUTFLOW	1.	0.	3.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
.05	393.37	0.00	42.	2.	0.00	20.92	0.00
.08	394.84	0.00	51.	2.	0.00	24.00	0.00
.09	395.31	0.00	55.	2.	0.00	24.00	0.00
.10	395.76	0.00	58.	3.	0.00	24.00	0.00
.11	396.07	.17	60.	8.	5.75	19.92	0.00
.12	396.19	.29	61.	25.	6.75	18.42	0.00
.15	396.31	.41	61.	63.	8.17	17.00	0.00
.50	397.35	1.45	69.	1206.	10.83	15.67	0.00
1.00	398.03	2.13	74.	2530.	12.50	15.67	0.00

CM&T	U.S. ARMY ENGINEER DISTRICT, ST. LOUIS CORPS OF ENGINEERS NATIONAL DAM SAFETY PROGRAM	SUMMARY TABLE BURNETT LAKE DAM MO40069

EXHIBIT 10

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*A1 HYDROLOGIC/HYDRAULIC ANALYSIS -- BURNETT LAKE DAM(MO 40069), SCOTT COUNTY, MO
 A2 NATIONAL DAM SAFETY PROGRAM -- CORPS OF ENGINEERS, ST. LOUIS DISTRICT
 A3 CM&T JOB NO. 8034-02                    JANUARY 7, 1981
 B     288       0       5                                    0       0      -2
 B1      3
 K       0   INFLOW                                           1
 K1 INFLOW HYDROGRAPH COMPUTATION FOR 1% PROBABILITY STORM
 M       0       2   0.175                            1
 O     288       0
 O1   .007    .007    .007    .007    .007    .007    .007    .007    .007    .007
 O1   .007    .007    .007    .007    .007    .007    .007    .007    .007    .007
 O1   .007    .007    .007    .007    .007    .007    .007    .007    .007    .007
 O1   .007    .007    .007    .007    .007    .007    .007    .007    .007    .007
 O1   .007    .007    .007    .007    .007    .007    .007    .007    .007    .007
 O1   .007    .007    .007    .007    .007    .007    .007    .007    .007    .007
 O1   .007    .007    .007    .007    .007    .007    .007    .007    .007    .007
 O1   .007    .007    .013    .013    .013    .013    .013    .013    .013    .013
 O1   .013    .013    .013    .013    .013    .013    .013    .013    .013    .013
 O1   .013    .013    .013    .013    .013    .013    .013    .013    .013    .013
 O1   .013    .013    .013    .013    .013    .013    .013    .013    .023    .023
 O1   .023    .023    .023    .023    .023    .023    .023    .023    .023    .023
 O1   .023    .023    .023    .023    .023    .023    .034    .034    .034    .034
 O1   .034    .034    .042    .042    .042    .042    .042    .042    .142    .142
 O1   .142    .272    .272    .540    .817    .376    .272    .142    .142    .142
 O1   .042    .042    .042    .042    .042    .042    .034    .034    .034    .034
 O1   .034    .034    .023    .023    .023    .023    .023    .023    .023    .023
 O1   .023    .023    .023    .023    .023    .023    .023    .023    .023    .023
 O1   .013    .013    .013    .013    .013    .013    .013    .013    .013    .013
 O1   .013    .013    .013    .013    .013    .013    .013    .013    .013    .013
 O1   .013    .013    .013    .013    .013    .013    .013    .013    .013    .013
 O1   .013    .013    .013    .013    .013    .013    .007    .007    .007    .007
 O1   .007    .007    .007    .007    .007    .007    .007    .007    .007    .007
 O1   .007    .007    .007    .007    .007    .007    .007    .007    .007    .007
 O1   .007    .007    .007    .007    .007    .007    .007    .007    .007    .007
 O1   .007    .007    .007    .007    .007    .007    .007    .007    .007    .007
 O1   .007    .007    .007    .007    .007    .007    .007    .007    .007    .007
 O1   .007    .007    .007    .007    .007    .007    .007    .007    .007    .007
 O1   .007    .007    .007    .007    .007    .007    .007    .007
 T                                                            1     -79            0.06
 W2          0.092
 X       0      .1    1.75
 K       1   LAKE                                             1
 K1 RESERVOIR ROUTING BY MODIFIED PULS METHOD
 Y                                            1
 Y1      1                                               -300.0       1
 Y4  300.0   301.0   302.0   304.0   306.0   308.0
 Y5      0     1.0     1.5     2.1     2.7     3.1
 $A      0     0.7     4.7     8.7
 $E    378     380     390     400
 $$  300.0
 $D  305.9     2.6     1.5     204
 $L      0      40      70     160     210     300     340     380
 $V  305.0   306.0   306.1   306.2   306.3   306.5   307.0   307.3
 K      99
 A
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CM&T	U.S. ARMY ENGINEER DISTRICT, ST. LOUIS CORPS OF ENGINEERS NATIONAL DAM SAFETY PROGRAM	INPUT DATA FOR 1% PROBABILITY STORM BURNETT LAKE DAM MO 40069

EXHIBIT 11

MO.DA	HR.MN	END-OF-PERIOD PERIOD	HOURS	HYDROGRAPH ORDINATES INFLOW	OUTFLOW	STORAGE	STAGE
1.01	.05	1	.08	0.	0.	25.	390.0
1.01	.10	2	.17	0.	0.	25.	390.0
1.01	.15	3	.25	1.	0.	25.	390.0
1.01	.20	4	.33	1.	0.	25.	390.0
1.01	.25	5	.42	1.	0.	25.	390.0
1.01	.30	6	.50	1.	0.	25.	390.0
1.01	.35	7	.58	1.	0.	25.	390.0
1.01	.40	8	.67	1.	0.	25.	390.0
1.01	.45	9	.75	1.	0.	25.	390.0
1.01	.50	10	.83	1.	0.	25.	390.0
1.01	.55	11	.92	1.	0.	25.	390.0
1.01	1.00	12	1.00	1.	0.	25.	390.0
1.01	1.05	13	1.08	1.	0.	25.	390.0
1.01	1.10	14	1.17	1.	0.	25.	390.0
1.01	1.15	15	1.25	1.	0.	25.	390.0
1.01	1.20	16	1.33	1.	0.	25.	390.0
1.01	1.25	17	1.42	1.	0.	25.	390.0
1.01	1.30	18	1.50	1.	0.	25.	390.0
1.01	1.35	19	1.58	1.	0.	25.	390.0
1.01	1.40	20	1.67	1.	0.	25.	390.0
1.01	1.45	21	1.75	1.	0.	25.	390.0
1.01	1.50	22	1.83	1.	0.	25.	390.0
1.01	1.55	23	1.92	1.	0.	25.	390.0
1.01	2.00	24	2.00	1.	0.	25.	390.0
1.01	2.05	25	2.08	1.	0.	25.	390.0
1.01	2.10	26	2.17	1.	0.	25.	390.0
1.01	2.15	27	2.25	1.	0.	25.	390.0
1.01	2.20	28	2.33	1.	0.	25.	390.0
1.01	2.25	29	2.42	1.	0.	25.	390.0
1.01	2.30	30	2.50	1.	0.	25.	390.0
1.01	2.35	31	2.58	1.	0.	25.	390.0
1.01	2.40	32	2.67	1.	0.	25.	390.0
1.01	2.45	33	2.75	1.	0.	25.	390.0
1.01	2.50	34	2.83	1.	0.	25.	390.0
1.01	2.55	35	2.92	1.	0.	25.	390.0
1.01	3.00	36	3.00	1.	0.	25.	390.0
1.01	3.05	37	3.08	1.	0.	25.	390.0
1.01	3.10	38	3.17	1.	0.	25.	390.0
1.01	3.15	39	3.25	1.	0.	25.	390.0
1.01	3.20	40	3.33	1.	0.	25.	390.0
1.01	3.25	41	3.42	1.	0.	25.	390.0
1.01	3.30	42	3.50	1.	0.	25.	390.0
1.01	3.35	43	3.58	1.	0.	25.	390.0
1.01	3.40	44	3.67	1.	0.	25.	390.0
1.01	3.45	45	3.75	1.	0.	25.	390.0
1.01	3.50	46	3.83	1.	0.	25.	390.0
1.01	3.55	47	3.92	1.	0.	25.	390.0
1.01	4.00	48	4.00	1.	0.	25.	390.0
1.01	4.05	49	4.08	1.	0.	25.	390.0
1.01	4.10	50	4.17	1.	0.	25.	390.0
1.01	4.15	51	4.25	1.	0.	25.	390.0
1.01	4.20	52	4.33	1.	0.	25.	390.0
1.01	4.25	53	4.42	1.	0.	25.	390.0
1.01	4.30	54	4.50	1.	0.	25.	390.0
1.01	4.35	55	4.58	1.	0.	25.	390.0
1.01	4.40	56	4.67	1.	0.	25.	390.0
1.01	4.45	57	4.75	1.	0.	25.	390.0
1.01	4.50	58	4.83	1.	0.	25.	390.0
1.01	4.55	59	4.92	1.	0.	25.	390.0
1.01	5.00	60	5.00	1.	0.	25.	390.0
1.01	5.05	61	5.08	1.	0.	25.	390.0
1.01	5.10	62	5.17	1.	0.	25.	390.0
1.01	5.15	63	5.25	1.	0.	25.	390.0
1.01	5.20	64	5.33	1.	0.	25.	390.0
1.01	5.25	65	5.42	1.	0.	25.	390.1
1.01	5.30	66	5.50	1.	0.	25.	390.1
1.01	5.35	67	5.58	1.	0.	25.	390.1
1.01	5.40	68	5.67	1.	0.	25.	390.1
1.01	5.45	69	5.75	1.	0.	25.	390.1
1.01	5.50	70	5.83	1.	0.	25.	390.1
1.01	5.55	71	5.92	1.	0.	25.	390.1
1.01	6.00	72	6.00	1.	0.	25.	390.1
1.01	6.05	73	6.08	1.	0.	25.	390.1
1.01	6.10	74	6.17	1.	0.	25.	390.1
1.01	6.15	75	6.25	1.	0.	25.	390.1
1.01	6.20	76	6.33	1.	0.	25.	390.1
[illegible]	[illegible]	77	6.42	1.	0.	25.	390.1

MO.DA	HR.MN	END-OF-PERIOD PERIOD	HOURS	HYDROGRAPH ORDINATES INFLOW	OUTFLOW	STORAGE	STAGE
1.01	12.05	145	12.08	584.	2.	38.	392.6
1.01	12.10	146	12.17	626.	2.	42.	393.3
1.01	12.15	147	12.25	469.	2.	46.	393.9
1.01	12.20	148	12.33	324.	2.	48.	394.4
1.01	12.25	149	12.42	226.	2.	50.	394.6
1.01	12.30	150	12.50	189.	2.	52.	394.9
1.01	12.35	151	12.58	137.	2.	53.	395.0
1.01	12.40	152	12.67	82.	2.	53.	395.1
1.01	12.45	153	12.75	62.	2.	54.	395.2
1.01	12.50	154	12.83	59.	2.	54.	395.3
1.01	12.55	155	12.92	56.	3.	55.	395.3
1.01	13.00	156	13.00	53.	3.	55.	395.4
1.01	13.05	157	13.08	50.	3.	55.	395.4
1.01	13.10	158	13.17	47.	3.	56.	395.4
1.01	13.15	159	13.25	45.	3.	56.	395.5
1.01	13.20	160	13.33	42.	3.	56.	395.6
1.01	13.25	161	13.42	41.	3.	57.	395.6
1.01	13.30	162	13.50	41.	3.	57.	395.6
1.01	13.35	163	13.58	39.	3.	57.	395.7
1.01	13.40	164	13.67	37.	3.	57.	395.7
1.01	13.45	165	13.75	35.	3.	58.	395.8
1.01	13.50	166	13.83	33.	3.	58.	395.8
1.01	13.55	167	13.92	31.	3.	58.	395.8
1.01	14.00	168	14.00	29.	3.	58.	395.8
1.01	14.05	169	14.08	28.	3.	58.	395.9
1.01	14.10	170	14.17	28.	3.	58.	395.9
1.01	14.15	171	14.25	28.	3.	59.	395.9
1.01	14.20	172	14.33	28.	3.	59.	395.9
1.01	14.25	173	14.42	28.	3.	59.	396.0
1.01	14.30	174	14.50	28.	3.	59.	396.0
1.01	14.35	175	14.58	28.	4.	59.	396.0
1.01	14.40	176	14.67	28.	5.	59.	396.0
1.01	14.45	177	14.75	28.	6.	60.	396.0
1.01	14.50	178	14.83	28.	8.	60.	396.1
1.01	14.55	179	14.92	28.	9.	60.	396.1
1.01	15.00	180	15.00	28.	11.	60.	396.1
1.01	15.05	181	15.08	27.	12.	60.	396.1
1.01	15.10	182	15.17	25.	14.	60.	396.1
1.01	15.15	183	15.25	24.	15.	60.	396.1
1.01	15.20	184	15.33	22.	16.	60.	396.1
1.01	15.25	185	15.42	21.	17.	60.	396.1
1.01	15.30	186	15.50	20.	17.	60.	396.1
1.01	15.35	187	15.58	19.	17.	60.	396.2
1.01	15.40	188	15.67	18.	18.	60.	396.2
1.01	15.45	189	15.75	17.	18.	60.	396.2
1.01	15.50	190	15.83	16.	17.	60.	396.2
1.01	15.55	191	15.92	16.	17.	60.	396.1
1.01	16.00	192	16.00	16.	17.	60.	396.1
1.01	16.05	193	16.08	16.	17.	60.	396.1
1.01	16.10	194	16.17	16.	17.	60.	396.1
1.01	16.15	195	16.25	16.	17.	60.	396.1
1.01	16.20	196	16.33	16.	17.	60.	396.1
1.01	16.25	197	16.42	16.	16.	60.	396.1
1.01	16.30	198	16.50	16.	16.	60.	396.1
1.01	16.35	199	16.58	16.	16.	60.	396.1
1.01	16.40	200	16.67	16.	16.	60.	396.1
1.01	16.45	201	16.75	16.	16.	60.	396.1
1.01	16.50	202	16.83	16.	16.	60.	396.1
1.01	16.55	203	16.92	16.	16.	60.	396.1
1.01	17.00	204	17.00	16.	16.	60.	396.1
1.01	17.05	205	17.08	16.	16.	60.	396.1
1.01	17.10	206	17.17	16.	16.	60.	396.1
1.01	17.15	207	17.25	16.	16.	60.	396.1
1.01	17.20	208	17.33	16.	16.	60.	396.1
1.01	17.25	209	17.42	16.	16.	60.	396.1
1.01	17.30	210	17.50	16.	16.	60.	396.1
1.01	17.35	211	17.58	16.	16.	60.	396.1
1.01	17.40	212	17.67	16.	16.	60.	396.1
1.01	17.45	213	17.75	16.	16.	60.	396.1
1.01	17.50	214	17.83	16.	16.	60.	396.1
1.01	17.55	215	17.92	16.	16.	60.	396.1
1.01	18.00	216	18.00	16.	16.	60.	396.1
1.01	18.05	217	18.08	15.	16.	60.	396.1
1.01	18.10	218	18.17	14.	16.	60.	396.1
1.01	18.15	219	18.25	14.	16.	60.	396.1
1.01	18.20	220	18.33	13.	15.	60.	396.1
1.01	18.25	221	18.42	12.	15.	60.	396.1

1.01	5.45	69	5.75	1.	0.	25.	390.1	1.01	17.45	213	17.75	16.	16.	60.	396.1
1.01	5.50	70	5.83	1.	0.	25.	390.1	1.01	17.50	214	17.83	16.	16.	60.	396.1
1.01	5.55	71	5.92	1.	0.	25.	390.1	1.01	17.55	215	17.92	16.	16.	60.	396.1
1.01	6.00	72	6.00	1.	0.	25.	390.1	1.01	18.00	216	18.00	16.	16.	60.	396.1
1.01	6.05	73	6.08	1.	0.	25.	390.1	1.01	18.05	217	18.08	15.	16.	60.	396.1
1.01	6.10	74	6.17	1.	0.	25.	390.1	1.01	18.10	218	18.17	14.	16.	60.	396.1
1.01	6.15	75	6.25	1.	0.	25.	390.1	1.01	18.15	219	18.25	14.	16.	60.	396.1
1.01	6.20	76	6.33	1.	0.	25.	390.1	1.01	18.20	220	18.33	13.	15.	60.	396.1
1.01	6.25	77	6.42	1.	0.	25.	390.1	1.01	18.25	221	18.42	12.	15.	60.	396.1
1.01	6.30	78	6.50	1.	0.	25.	390.1	1.01	18.30	222	18.50	11.	15.	60.	396.1
1.01	6.35	79	6.58	2.	0.	25.	390.1	1.01	18.35	223	18.58	11.	14.	60.	396.1
1.01	6.40	80	6.67	2.	0.	25.	390.1	1.01	18.40	224	18.67	10.	14.	60.	396.1
1.01	6.45	81	6.75	2.	0.	25.	390.1	1.01	18.45	225	18.75	10.	13.	60.	396.1
1.01	6.50	82	6.83	2.	0.	25.	390.1	1.01	18.50	226	18.83	9.	13.	60.	396.1
1.01	6.55	83	6.92	2.	0.	25.	390.1	1.01	18.55	227	18.92	9.	13.	60.	396.1
1.01	7.00	84	7.00	2.	0.	25.	390.1	1.01	19.00	228	19.00	9.	12.	60.	396.1
1.01	7.05	85	7.08	2.	0.	25.	390.1	1.01	19.05	229	19.08	9.	12.	60.	396.1
1.01	7.10	86	7.17	3.	0.	25.	390.1	1.01	19.10	230	19.17	9.	12.	60.	396.1
1.01	7.15	87	7.25	3.	0.	25.	390.1	1.01	19.15	231	19.25	9.	11.	60.	396.1
1.01	7.20	88	7.33	3.	0.	25.	390.1	1.01	19.20	232	19.33	9.	11.	60.	396.1
1.01	7.25	89	7.42	3.	0.	25.	390.1	1.01	19.25	233	19.42	9.	11.	60.	396.1
1.01	7.30	90	7.50	3.	0.	25.	390.1	1.01	19.30	234	19.50	9.	11.	60.	396.1
1.01	7.35	91	7.58	3.	0.	25.	390.1	1.01	19.35	235	19.58	9.	11.	60.	396.1
1.01	7.40	92	7.67	3.	0.	25.	390.1	1.01	19.40	236	19.67	9.	10.	60.	396.1
1.01	7.45	93	7.75	4.	0.	25.	390.1	1.01	19.45	237	19.75	9.	10.	60.	396.1
1.01	7.50	94	7.83	4.	0.	25.	390.1	1.01	19.50	238	19.83	9.	10.	60.	396.1
1.01	7.55	95	7.92	4.	0.	25.	390.1	1.01	19.55	239	19.92	9.	10.	60.	396.1
1.01	8.00	96	8.00	4.	0.	25.	390.1	1.01	20.00	240	20.00	9.	10.	60.	396.1
1.01	8.05	97	8.08	4.	0.	25.	390.1	1.01	20.05	241	20.08	9.	10.	60.	396.1
1.01	8.10	98	8.17	4.	0.	25.	390.1	1.01	20.10	242	20.17	9.	10.	60.	396.1
1.01	8.15	99	8.25	4.	0.	25.	390.1	1.01	20.15	243	20.25	9.	10.	60.	396.1
1.01	8.20	100	8.33	4.	0.	25.	390.2	1.01	20.20	244	20.33	9.	10.	60.	396.1
1.01	8.25	101	8.42	5.	0.	25.	390.2	1.01	20.25	245	20.42	9.	9.	60.	396.1
1.01	8.30	102	8.50	5.	0.	25.	390.2	1.01	20.30	246	20.50	9.	9.	60.	396.1
1.01	8.35	103	8.58	5.	0.	25.	390.2	1.01	20.35	247	20.58	9.	9.	60.	396.1
1.01	8.40	104	8.67	5.	0.	25.	390.2	1.01	20.40	248	20.67	9.	9.	60.	396.1
1.01	8.45	105	8.75	5.	0.	25.	390.2	1.01	20.45	249	20.75	9.	9.	60.	396.1
1.01	8.50	106	8.83	5.	0.	25.	390.2	1.01	20.50	250	20.83	9.	9.	60.	396.1
1.01	8.55	107	8.92	5.	0.	25.	390.2	1.01	20.55	251	20.92	9.	9.	60.	396.1
1.01	9.00	108	9.00	5.	0.	26.	390.2	1.01	21.00	252	21.00	9.	9.	60.	396.1
1.01	9.05	109	9.08	7.	0.	26.	390.2	1.01	21.05	253	21.08	9.	9.	60.	396.1
1.01	9.10	110	9.17	9.	0.	26.	390.2	1.01	21.10	254	21.17	9.	9.	60.	396.1
1.01	9.15	111	9.25	10.	0.	26.	390.2	1.01	21.15	255	21.25	9.	9.	60.	396.1
1.01	9.20	112	9.33	10.	0.	26.	390.3	1.01	21.20	256	21.33	9.	9.	60.	396.1
1.01	9.25	113	9.42	11.	0.	26.	390.3	1.01	21.25	257	21.42	9.	9.	60.	396.1
1.01	9.30	114	9.50	11.	0.	26.	390.3	1.01	21.30	258	21.50	9.	9.	60.	396.1
1.01	9.35	115	9.58	11.	0.	26.	390.3	1.01	21.35	259	21.58	9.	9.	60.	396.1
1.01	9.40	116	9.67	12.	0.	26.	390.3	1.01	21.40	260	21.67	9.	9.	60.	396.1
1.01	9.45	117	9.75	12.	0.	26.	390.3	1.01	21.45	261	21.75	9.	9.	60.	396.1
1.01	9.50	118	9.83	12.	0.	26.	390.3	1.01	21.50	262	21.83	9.	9.	60.	396.1
1.01	9.55	119	9.92	12.	0.	26.	390.4	1.01	21.55	263	21.92	9.	9.	60.	396.1
1.01	10.00	120	10.00	13.	0.	26.	390.4	1.01	22.00	264	22.00	9.	9.	60.	396.1
1.01	10.05	121	10.08	13.	0.	26.	390.4	1.01	22.05	265	22.08	9.	9.	60.	396.1
1.01	10.10	122	10.17	13.	0.	27.	390.4	1.01	22.10	266	22.17	9.	9.	60.	396.1
1.01	10.15	123	10.25	13.	0.	27.	390.4	1.01	22.15	267	22.25	9.	9.	60.	396.1
1.01	10.20	124	10.33	14.	0.	27.	390.5	1.01	22.20	268	22.33	9.	9.	60.	396.1
1.01	10.25	125	10.42	14.	0.	27.	390.5	1.01	22.25	269	22.42	9.	9.	60.	396.1
1.01	10.30	126	10.50	14.	0.	27.	390.5	1.01	22.30	270	22.50	9.	9.	60.	396.1
1.01	10.35	127	10.58	17.	1.	27.	390.5	1.01	22.35	271	22.58	9.	9.	60.	396.1
1.01	10.40	128	10.67	20.	1.	27.	390.5	1.01	22.40	272	22.67	9.	9.	60.	396.1
1.01	10.45	129	10.75	21.	1.	27.	390.6	1.01	22.45	273	22.75	9.	9.	60.	396.1
1.01	10.50	130	10.83	22.	1.	27.	390.6	1.01	22.50	274	22.83	9.	9.	60.	396.1
1.01	10.55	131	10.92	23.	1.	28.	390.6	1.01	22.55	275	22.92	9.	9.	60.	396.1
1.01	11.00	132	11.00	23.	1.	28.	390.7	1.01	23.00	276	23.00	9.	9.	60.	396.1
1.01	11.05	133	11.08	26.	1.	28.	390.7	1.01	23.05	277	23.08	9.	9.	60.	396.1
1.01	11.10	134	11.17	28.	1.	28.	390.7	1.01	23.10	278	23.17	9.	9.	60.	396.1
1.01	11.15	135	11.25	30.	1.	28.	390.8	1.01	23.15	279	23.25	9.	9.	60.	396.1
1.01	11.20	136	11.33	31.	1.	28.	390.8	1.01	23.20	280	23.33	9.	9.	60.	396.1
1.01	11.25	137	11.42	31.	1.	29.	390.9	1.01	23.25	281	23.42	9.	9.	60.	396.1
1.01	11.30	138	11.50	32.	1.	29.	390.9	1.01	23.30	282	23.50	9.	9.	60.	396.1
1.01	11.35	139	11.58	59.	1.	29.	391.0	1.01	23.35	283	23.58	9.	9.	60.	396.1
1.01	11.40	140	11.67	95.	1.	30.	391.1	1.01	23.40	284	23.67	9.	9.	60.	396.1
1.01	11.45	141	11.75	112.	1.	30.	391.2	1.01	23.45	285	23.75	9.	9.	60.	396.1
1.01	11.50	142	11.83	160.	1.	31.	391.4	1.01	23.50	286	23.83	9.	9.	60.	396.1
1.01	11.55	143	11.92	220.	1.	33.	391.6	1.01	23.55	287	23.92	9.	9.	60.	396.1
1.01	12.00	144	12.00	341.	1.	35.	392.0	1.02	0.00	288	24.00	9.	9.	60.	396.1

U.S. ARMY ENGINEER DISTRICT, ST. LOUIS
CORPS OF ENGINEERS
NATIONAL DAM SAFETY PROGRAM

INFLOW AND OUTFLOW 1% PROBABILITY STORM
BURNETT LAKE DAM MO40069

EXHIBIT 12

RUNOFF SUMMARY, AVERAGE FLOW IN CUBIC FEET PER SECOND (CUBIC METERS PER SECOND)
AREA IN SQUARE MILES(SQUARE KILOMETERS)

		PEAK	6-HOUR	24-HOUR	72-HOUR	AREA
HYDROGRAPH AT	INFLOW	626.	74.	23.	23.	.18
		(17.74)(	2.08)(	.65)(	.65)(	.45)
ROUTED TO	LAKE	18.	14.	5.	5.	.18
		(.50)(	.39)(	.14)(	.14)(	.45)

SUMMARY OF DAM SAFETY ANALYSIS

....	INITIAL VALUE	SPILLWAY CREST	TOP OF DAM
ELEVATION	390.00	390.00	395.90
STORAGE	25.	25.	59.
OUTFLOW	0.	0.	3.

RATIO OF PMF	MAXIMUM RESERVOIR W.S.ELEV	MAXIMUM DEPTH OVER DAM	MAXIMUM STORAGE AC-FT	MAXIMUM OUTFLOW CFS	DURATION OVER TOP HOURS	TIME OF MAX OUTFLOW HOURS	TIME OF FAILURE HOURS
0.00	396.15	.25	60.	18.	9.83	15.67	0.00

CM&T

U.S. ARMY ENGINEER DISTRICT, ST. LOUIS
CORPS OF ENGINEERS
NATIONAL DAM SAFETY PROGRAM

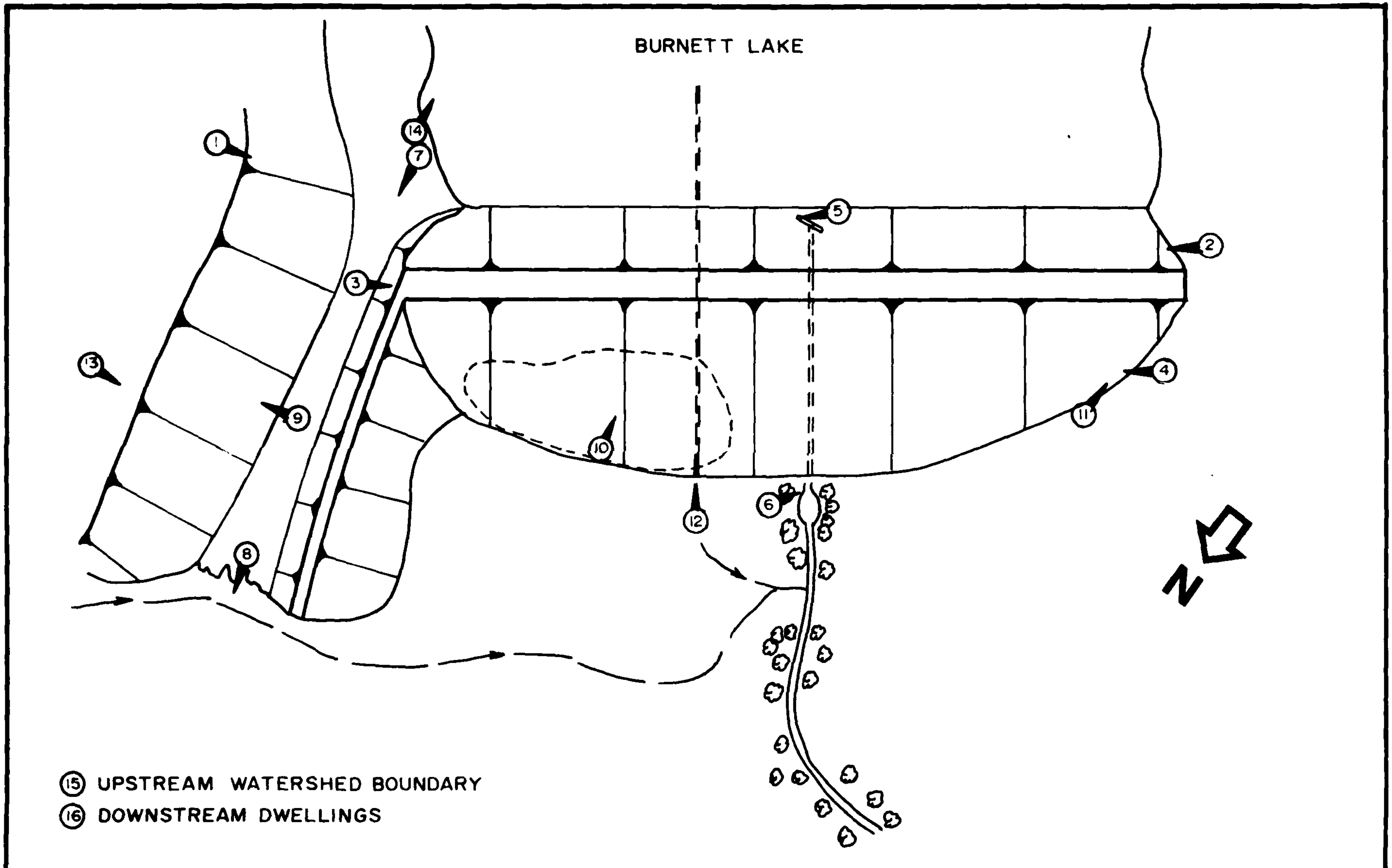
SUMMARY TABLE
1% PROBABILITY STORM
BURNETT LAKE DAM MO40069

EXHIBIT 13

PHASE I INSPECTION REPORT

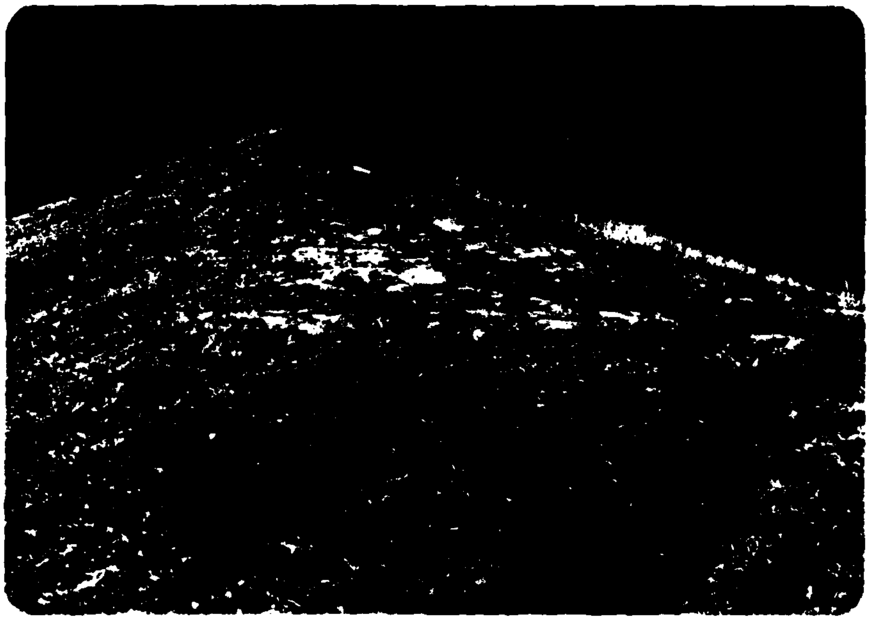
APPENDIX C

PHOTOGRAPHS



CRAWFORD MURPHY & TILLY, inc. Consulting Engineers SPRINGFIELD, IL • LINCOLN, IL • AURORA, IL	U.S. ARMY ENGINEER DISTRICT, ST. LOUIS CORPS OF ENGINEERS NATIONAL DAM SAFETY PROGRAM	PHOTOGRAPH INDEX BURNETT LAKE DAM MO40069

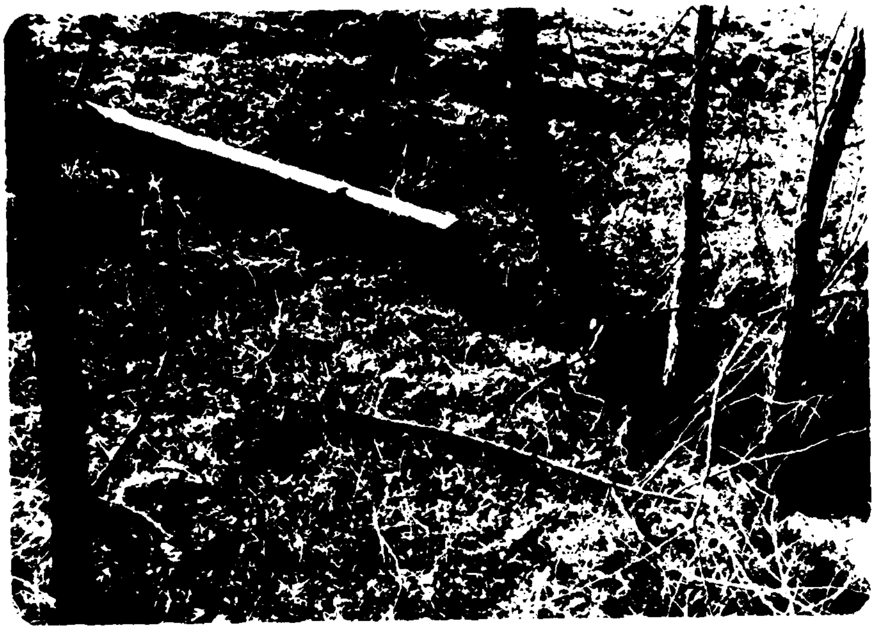
Photograph 2. Upstream slope and crest of dam viewed from the left abutment.



Photograph 3. Crest of dam viewed from right abutment.

Photograph 4. Downstream slope of dam viewed from the left abutment.

Photograph 5. View of intake of principal spillway pipe.



Photograph 6. Outlet end of principal spillway pipe.

Photograph 7. View of emergency spillway channel looking downstream.

Photograph 8. Downstream end of emergency spillway channel. Note sharp drop due to erosion and discharge ditch.

Photograph 9. Right slope of emergency spillway channel.

Photograph 10. Hole in embankment on the downstream face.

Photograph 11. Junction of downstream face of the dam with the left abutment.

Photograph 12. Downstream end of drawdown pipe and gate valve.

Photograph 13. View of downstream channel from near right abutment.

Photograph 14. View of lake from right abutment.

Photograph 15. View of drainage area near upstream boundary.

Photograph 16. View of dwellings in downstream hazard zone. Downstream channel is immediately behind dwellings.

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